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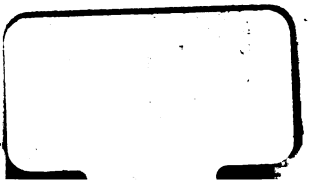

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*TECHNICAL EDUCATION SERIES No. 6.*

DEPARTMENT OF PUBLIC INSTRUCTION:

TECHNICAL EDUCATION BRANCH—F. BRIDGES, *Superintendent.*

# WATTLES AND WATTLE-BARKS,

BEING

## HINTS ON THE CONSERVATION AND CULTIVATION OF WATTLES,

TOGETHER WITH PARTICULARS OF THEIR VALUE.

BY

J. H. MAIDEN, F.L.S., F.C.S., &c.,

CURATOR OF THE TECHNOLOGICAL MUSEUM, SYDNEY;
PRESIDENT OF THE FIELD NATURALISTS' SOCIETY OF NEW SOUTH WALES;
AUTHOR OF "THE USEFUL NATIVE PLANTS OF AUSTRALIA,"
&c., &c.

SYDNEY: CHARLES POTTER, GOVERNMENT PRINTER.

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# INTRODUCTORY.

THIS little work is the practical outcome of many years of research and observation in the subject matter on the part of the Curator of the Technological Museum, Sydney. It has been prepared and is being published at the present time at the request of the Department of Public Instruction, which has recently assumed the direct control of Technical Education in this Colony. It is hoped that the information sought to be diffused will direct attention to, and will stir enterprise in, the cultivation of the more valuable wattles. The experiments in wattle culture in Victoria and South Australia have resulted in practical success, and in the latter Colony the industry is being carried on with increasing vigour as a profitable pursuit. There is no sound reason why similar good results should not be achieved in New South Wales, which has in many parts both soil and climate well adapted for this special culture. Success in this industry means a vast increase in productive wealth to the Colony, and in view of that fact I feel that the public should receive the full benefit of whatever information may be in the possession of this Department.

J. H. CARRUTHERS,

*Minister for Public Instruction.*

30 *May*, 1890.

# PREFACE.

THIS pamphlet is issued to supply farmers, tanners, merchants, and others with authentic information in regard to the value of wattles. The demand for good wattle-bark becomes greater every year, while the supply does not cope with it. The cultivation of wattles is not a theoretical matter; it is easy, remunerative, and has already entered the domain of practical farming. Australia is the native country of wattles; they grow in the poorest soil, and require only a moderate rainfall. Their cultivation is strongly recommended to farmers who have a patch of poor soil which they cannot otherwise profitably utilize. The return is in about five to seven years, and attention to the wattle plantation can be chiefly given in the spare hours which are available on every farm. Farmers in some districts could be recommended to put as much land as possible under wattle, provided they had the means to wait. At present only the following wattles are recommended to be planted:—

The South Australian Broad-leaved Wattle, *Acacia pycnantha.*
The Sydney Black Wattle, *Acacia decurrens.*
The Tasmanian and Victorian Black Wattle, *Acacia mollissima.*

At the same time, reference to the detailed information given in regard to other wattles will show that many of them are worthy of conservation if farmers have them on their land, and further experience may show that some are even worthy of local cultivation. The three wattles specially mentioned, however, with their extended geographical range and proved value, are sufficient for all practical purposes at present.

I desire to express my obligations to my assistant, Mr. R. T. Baker, and to Mr. H. G. Smith, also of the Museum Staff, for valuable help.

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# WATTLES AND WATTLE-BARKS.

## Meaning of the word "Wattle."

It is desirable that we should become conversant with the meaning of the terms we use, and therefore I proceed to give the meaning of the word wattle, which is usually employed merely as a name.

In Webster's Dictionary (see also Skeat) a wattle is defined as a twig or flexible rod; a hurdle made of such rods; a rod laid on a roof to support the thatch. Hence, when used as a verb, it signifies to bind with twigs; to twist or interweave (twigs) one with another; to plait, to form of plaited twigs. It has the same derivation as the word *wallet*, both being from the Anglo-Saxon *watel*, a hurdle, covering; in Middle English signifying a bag; the verb is *watelen*, to wattle, twist together, strengthen with hurdles. It is a matter of common knowledge how small trees were used in the manner indicated in the above definitions, in the erection of various structures in the early days of the Colony. *Acacias* were undoubtedly used (with other small trees), and it is interesting to the student of language to note how the word wattle has now become practically synonymous with *Acacia*.

The Rev. Dr. Woolls, however, assures me that the earliest application of the word wattle was not to an *Acacia* at all, but to *Callicoma serratifolia*, Andr., a small tree belonging to the *Saxifrageæ*, and which is generally found near watercourses. It was probably abundant along the course of the streams which flowed into "Sydney Cove;" and in the earliest records of "dab and wattle" structures, the tough saplings of this species were alluded to. It is called "black wattle," at page 201 of vol. iii of Don's work on Dichlamydeous Plants, published in 1834. The compact round heads of flowers have a general resemblance to those of wattles, and I have, on more than one occasion, when out in the bush, been asked by an unbotanical companion, "What kind of wattle is this?"

## Demand and Supply.

As regards the importance of a supply of wattle-bark to European manufacturers, and the remote possibility of the market being over-supplied, I quote the following, by a correspondent of Mr. J. E. Brown, Conservator of Forests of South Australia:—"The matter of supply and demand can be compressed into small compass. British and Continental tanners are languishing for ample and continuous supply, and South Australia exports in such driblets that very many of the large firms in Great Britain have given over using it, falling back on Valonia and other barks more *fully* and *regularly* supplied. I may be allowed to remark here, reliable leather cannot be pro-

duced by intermittent and inadequate supply of bark, on which the tanner relies when laying down his hides; indeed, in large yards, such as with 50,000 hides always in the pits, it becomes a very serious difficulty, attended with anxiety and loss, not to be able, through want of sufficiency of bark of a class, to work them through successfully. It therefore becomes a matter of necessity that the exports of bark may be abundant and regular to such an extent as tanners may confidently rely on. To such low export of wattle-bark have your growers now arrived at, that *one yard* could manage to take fully *one-fourth*—say 1,000 tons—of all the bark shipped from your ports to England in 1882, and about one-third of the shipments for 1883. . . . I am aware French and German tanners highly approve of the wattle for tanning purposes." (*Report to S. A. Legislative Council*, 1884.)

Throughout Australia the species of wattle richest in tannic acid are becoming seriously diminished, and there is a consensus of opinion amongst persons interested in the matter that the various Governments should encourage the replanting of them. At the same time there are some species of wattle which tanners despise (partly because the introduction of them would disturb the routine of their operations), which are even richer than some of the tan-barks in common use in Europe and elsewhere, and there is no doubt that, sooner or later, our local tanners will have to fall back upon these second-grade wattle-barks, unless the cultivation of good wattles is actively entered upon.

In regard to Tasmania, which has hitherto supplied so large a quantity of good wattle-bark, Mr. F. Abbott, Superintendent of the Botanical Gardens, Hobart, says:—"We have so many wattle trees growing naturally, that we have had no need to cultivate them in Tasmania, but the destruction is so great we shall have to do it before long." (He refers to *Acacia mollissima*.)

Mr. F. Donovan, representative of the Tanners' and Curriers' Union of Melbourne, in giving evidence before the Royal Commission on Vegetable Products, states that for the bark which in 1872 cost £3 15s. per ton, £8 or £9 was paid in 1887, and he is very emphatic on the necessity of wattle culture on a large scale. Mr. Dunn, a tanner, gave evidence to the effect that in 1872 wattle-bark was selling from £2 10s. to £3 a ton. In 1879 the price had gone up as high as £9 10s., and since then it has varied from £8 10s. to £11; in 1887 the best bark was £10.

The best Sydney bark has fetched £10 this season, and this appears to be the top price on the average.

# Cultivation of Wattles.

## (a.) SOIL.

THERE IS a consensus of opinion that wattles will grow on the poorest soil, and thus it is that land can be utilized in this industry when it can scarcely be put under any other cultivation, and where not even grass grows. At the same time, bark richer in tannic acid and maturing earlier, may be obtained from trees growing on richer soil.

"The bark obtained from trees growing on limestone* formations is greatly inferior in tannin to that of trees grown on any other formation."

* "Nevertheless wattles grow exceedingly well on limestone country in South Australia." (F. Wurm, in *Journ. Bureau Agric., S.A.*, April, 1890.) See also some of my analyses of barks grown on limestone country.

(*Report of Wattle-bark Board*, Melbourne, 1878.) This is the only observation of the kind with which I am acquainted, and more are required; nevertheless, I do not hesitate to recommend farmers to utilize *any* poor land they may have for wattle culture.

"Sandy soil is best, lying upon a clay subsoil.....I do not think that taking a crop of wattles off land renders it useless for other crops; but I consider it an advantage rather than otherwise, from the deposit of leaves, which manures the land for other crops. There is nothing to prevent one crop of wattles following another immediately; you may take three or four off without interfering with the productiveness of the soil." (J. E. Brown.)

In preparing the land, if it be virgin soil, unencumbered with scrub and of a light nature, breaking up of the surface, sowing the seeds, and harrowing is all that is necessary. If the land be covered with scrub or other vegetation these should be cut down, burnt, and the land prepared in the usual way.

It must not be understood that any careless kind of cultivation will do for wattles, although when once started, they will thrive with scarcely any attention, but like other crops, the better the system of cultivation adopted, the better the yield and therefore the greater the profit.

### (b.) MOISTURE.

Wattles like a moderate amount of moisture, say from 18 to 20 inches. (F. Abbott.) Mr. J. E. Brown has grown wattles successfully with 10 inches of rainfall, but ordinary cultivators will not usually succeed with less than 16 to 20 inches per annum.

On the other hand, it is not good for wattle-trees to have an unlimited supply of water, as they then tend to throw out too much leaf, and the bark becomes flabby and deficient in tannic acid.

### (c.) SOWING AND GERMINATION OF THE SEED.

The outer covering of the seed is of great hardness, and under ordinary circumstances it will remain in the ground for many years before germination.

I am indebted to Mr. William Neilley, of Sydney, for what appears to be a well-authenticated instance of wattle seed remaining dormant in the ground for over 37 years. An allotment of land in the town of Bega, purchased from Mr. Spence, formerly had wattles on it, but the trees and all wattles near had long since been destroyed. After a lapse of 37 years Mr. Neilley had the land ploughed, and wattles sprang up thickly when the ground was trenched.

Bush-fires, however, usually hasten matters; and it is well known that perfect forests of young wattles spring up in many places after these occurrences. The operations of nature are therefore assisted in practice by means of heat, and this heat may be either dry or moist. For the first, Mr. J. E. Brown recommends a quantity of brushwood to be burnt down to the condition of expiring embers. "In this residuum of the fire the seed is

placed, and mixed up with the ashes and charred coals, and the whole is then allowed to remain until cooled down. The seed is now ready for sowing. If the intention be to sow it singly, by dibbling or in some other way, it will have to be cleaned and separated from the residue of the fire by riddling, or by the aid of an ordinary grain-winnower. If, however, the seed is to be sown broadcast, it will be sufficient if the embers are raked off the heap, and the remainder, containing both ash and seed, stored ready for sowing. The advantage claimed for this method of preparation is that the seed can be sown either broadcast upon the ground without covering, or dibbled in the soil in the ordinary way, at any season of the year, and especially before the winter rains set in." Care will, of course, require to be exercised to prevent loss by over-burning. A frying-pan* is used by some people for roasting wattle seeds.

Secondly, the method of treatment by boiling, or hot water. Mr. Brown has recommended that the seed be placed in a vessel, water *almost boiling* poured upon it, and left to soak for one or two days; the seed is then taken out and kept damp in a bag until swelling takes place. "The only drawback to this system is that, when sown, the seed must of necessity be covered with soil, and that the operation be carried out in the winter season only. Unless the seed be covered as it is put out, so as to keep up the necessary supply of moisture to complete germination, a change of dry weather would undoubtedly result in its entire loss." Nevertheless, this is the method which Mr. Brown recommends growers, especially beginners, to adopt.

Professor Tate, who, in addition to his scientific knowledge, has had much practical experience in wattle-planting, has instituted a series of experiments upon the temperature to which wattle seed may be exposed in assisting it to germinate. The experiments are useful, in that they enable the operation of treatment with hot water to be conducted with greater confidence. In my own case I have been afraid to destroy the vitality of seed by the application of too high a temperature, but Professor Tate shows that the seeds may be *boiled* for several minutes without injury, though there is no advantage in heating the water above 150° F. I quote his important experiments from Mr. Brown's Report:—

Experiment 1. *Acacia pycnantha.*—Equal parcels of seeds saturated with water at the following degrees of temperature:—

150°, 170°, 190°, 200°, 212° — The seeds germinated in about equal proportions at the end of three weeks.

Experiment 2. *Acacia decurrens* (*A. decurrens* var. *mollis* = *A. mollissima*, is here meant.—J.H.M.)—Seed saturated with boiling water, and kept in wet sand in a warm place, germinated at end of two weeks.

Experiment 3. *Acacia saligna.*—Seed saturated with water at 212°, July 22nd; seeds began to burst, July 29th.

Experiment 4. *Acacia pycnantha.*

July 22nd, boiled for 1 minute.
,, ,, 3 minutes.
,, ,, 5 ,,
,, ,, 7 ,,
— All the seeds germinated August 9th.

* The danger of over-heating will be minimised if a little water be put into the frying-pan.

The importance of care in the selection of seeds can hardly be over-estimated. They should be gathered from thoroughly healthy trees, for it is false economy to use any but the best procurable.

Mr. G. S. Perrin, State Conservator of Forests, Victoria, recommends half a bushel of sand to be mixed with each pound of seed sown, and after treating the seed with hot water, as before described, to broadcast thoroughly, as in sowing wheat. He justly remarks that, if done with discretion, much after-labour will be saved in the thinning process.

Mr. F. Abbott recommends that the seed be soaked and simply sown broadcast on ploughed ground.

In soaking seed (as directed) for sowing, sufficient only should be prepared for one day's sowing at a time. Where seed has been soaked and sown, it must be covered immediately with soil, say by means of light harrows.

Mr. J. E. Brown advocates the raising of wattles in bamboos. The raising of trees by this means is so common in India, has been so successfully carried out in South Australia,* by Mr. Brown, and is, withal so simple, that I give a brief account of the method here, compiled from that gentleman's evidence before the Victorian Royal Commission on Vegetable Products, and published in the Fourth Progress Report. A wattle planter in New South Wales substitutes little twists of brown paper for the "bamboos," and doubtless other simple expedients are in use.

*Method of Tree-propagation by means of "bamboos."*—In India the true bamboo is used because it is abundant; in South Australia a large South European reed† (*Arundo Donax*, Linn.), which locally bears the name of "bamboo," is used instead. The reed is cut to 4 inches in length, by means of a small circular saw driven by hand or water-power. Endeavours are made not to include joints in the pieces cut, but if one should occur it is bored through; the pieces are packed together upright, filled with soil, the seed put in, and allowed to remain there till the planting season. The seedling is transplanted in the "bamboo" just as it stands, and in cases where the bamboo is not sufficiently rotted, they are split up, in order to allow the roots to expand. Five hundred trees thus start their careers, and can be transported in one small box—a brandy case for instance.

In planting with wattles that wretched desert country near the Melbourne-Adelaide Railway, from Bordertown to Murray Bridge (hitherto considered useless for any purpose), Mr. J. E. Brown, in giving evidence before the above mentioned Commission, stated his intention simply to roll the scrub down, scatter the seed, and then set fire to the scrub. This rolling is effected by making a team of bullocks draw an old boiler; the larger saplings are previously cut with an axe.

"Five years ago I put in 50 acres of wattles in a very sandy portion of Mount Burr Forest, and next year I intend stripping it, and I have no doubt I shall receive 5 tons per acre from it. The country is very sandy—almost pure sand—the seed was sown broadcast, a flock of sheep run over it to trample it in, and the crop was so thick that we have had to thin it twice."—(J. E. Brown).

---

* It has also been tried to a limited extent in New South Wales.

† Sometimes known as the Danubian reed.

Mr. A. L. Thrupp, of Woodside, South Australia, is in timbered country opposed to the felling of the timber (non-wattle), as he is of opinion that the trees if ringed, form, even in their dead state, a protection of no mean value against frost and high winds for the young wattle plants.

Seed is preferably sown immediately the winter season has set in.

Mr. F. Krichauff, of South Australia, caused wattle seeds to be sown upon some sandy land in the Bugle Ranges during May and August. Those sown in August made much greater progress than those sown in May. The seeds were sown upon a young barley crop, and then trodden in by sheep.—(*Journal of S. A. Bureau of Agriculture*, Nov. 1889.)

Following are extracts from a leaflet, giving a few simple directions in regard to wattle cultivation, which has been issued by the Superintendent of Technical Education, under the direction of the Minister of Public Instruction. Some of the points have already been touched upon:—

"*Nursery.*—If there be only a small area to be planted with wattles it is best to raise seedlings in a nursery. Whilst young they can be easier looked after and protected. Wattles will not stand transplanting at every season of the year with any degree of success; therefore they should be planted in small flower-pots or bamboos, in which they can be readily taken to the open ground. If grown in flower-pots, three or four seeds in each will be sufficient. When the plants are up, weed out all but the strongest one. After they are a few weeks old the pots will be found to be full of root; they should then be removed to their permanent home. To take them out of the pots turn them upside down, and by placing a finger in the drainage hole at the bottom of the pot the plant with its roots can be easily taken out, and will suffer nothing by removal. In the State Nursery at Gosford the seeds are sown in boxes containing peaty loam, mixed with clean, sharp sand, the soil being kept always moist. When the seedlings are sufficiently established they are transferred to the open ground.

"*To sow broadcast or in drills.*—If the seeds have been assisted in their germination by means of hot ashes, rake or sift out the larger coals and sow the ashes with the seeds. If the germination has been commenced by the hot water process, mix the seed thoroughly with dry ashes or sand—this will prevent the seeds from sticking together—then sow broadcast or in drills in the usual way. If the seeds are to be dibbled they must be freed from the ashes. Whichever method be adopted for sowing, the seed should be well covered, and in the case of those that have been soaked in water this is essential, for a few hot and dry days would effectually check all further growth. Three or four seeds at about *three feet* apart is the distance required; this will allow for thinning.

"Do not cover the seeds too deeply; about an inch underground will be ample.

"Sow sparingly; this will save a lot of thinning afterwards."

### (d.) COMMERCE IN WATTLE-SEED.

It goes without saying that in order to assist the development of wattle cultivation, it is necessary that there must be increased facilities in New South Wales for procuring seed. I have already alluded to the fact that it would be false economy to allow considerations of price to stand in the way.

of obtaining the best seed procurable, for the ordinary cultivator only requires a pound or two, and the outside cost will only be a few shillings. Is the success of a plantation, perhaps involving an interest of hundreds of pounds, to be jeopardized through haggling with a seedsman over a few paltry shillings?

At present of course our seedsmen must obtain their supply of *Acacia pycnantha* seed from South Australia, and the *mollissima* seed from, perhaps, Tasmania and Victoria (though not necessarily, as it flourishes in our own Colony), while the *decurrens* seed, of excellent quality, may be obtained from within our own territory. It will be to the interests of Sydney and other seedsmen to establish local agents willing to push wattle-seed in districts already found suitable, or supposed to be so, for any or all of the species recommended for cultivation; and I hope it is unnecessary to insist on the common-sense advice of noting approximately the localities from which seed is collected, in order to prevent it being sent to districts totally different in climatic conditions. The best wattles are found growing under a great variety of circumstances, so there is no necessity to handicap the cultivation by ignoring local conditions.

## (e.) PRUNING AND THINNING.

Wattle-trees are sometimes recommended to be pruned. "The advantages of this are larger dimensions of individual trees, and hence more bark in proportion; cleaner stems, easier stripping at less expense, less liability to disease, and quicker returns, because the tree will arrive at the stripping stage sooner by having its vitality confined chiefly to the stem. The best period for pruning is during the months from January to March." (J. E. Brown). Mr. A. L. Thrupp however deprecates pruning in warm northern exposures, as too much sun would be admitted to the stem of the tree.

Mr. F. Abbott recommends that wattle seedlings be thinned out, as soon as they are big enough to handle, to 10 feet apart. This is perhaps a fair distance, but authorities do not agree as to the precise distance. It rather resolves itself into a matter of common-sense, for one must on the one hand avoid having wattles too close to each other, otherwise "leggy" trees are the result, and on the other hand trees too bushy are not desirable.

Wattle-trees should be transplanted with a moderate amount of care, as they are not the hardiest of plants to stand moving.

## (f.) PROFITS TO BE DERIVED FROM WATTLE CULTIVATION.

Wattle cultivation is in its infancy, and, as far as I know, no wattle-grower has favoured the world with a peep at the item "Wattle Cultivation" in his ledger. We are, therefore, chiefly dependent on estimates in lieu of statements of results attained, but those which follow are as trustworthy as can be supplied. Wattle conservation and cultivation have been little taken up in our own Colony, but we are already taking steps to remedy this.

Following are the opinions of gentlemen in the several colonies on the prospect of profit in wattle-planting. They are culled from the reports of the Victorian Royal Commission on Vegetable Products.

*New South Wales.*—Mr. Charles Moore, F.L.S., Director of the Botanic Gardens, Sydney,—"They are a very profitable crop indeed."

*Tasmania.*—Mr. F. Abbott, Curator of the Botanic Gardens, Hobart,—"I have not the shadow of a doubt that they are a valuable crop to any farmer; they come on in a very short period, and there is always a revenue from them."

*South Australia.*—Mr. J. E. Brown, F.L.S., Conservator of Forests, Adelaide,—"With regard, however, to the wattles, there can be but one opinion as to their cultivation being the means of a large and most valuable source of revenue both to individuals and to the State."

*Victoria.*—Mr. I. Hallenstein, tanner, currier, and leather merchant, Melbourne,—"I do not think a farmer or anyone with the means could produce any crop more valuable than the wattle-bark. We have got faith in it, or we would not have gone to the expense of putting 800 or 1,000 acres under cultivation."

The following evidence was given by Mr. W. Ferguson, Inspector of State Forests, Victoria:—

"I calculated that from the time the seed was sown at the Majorca plantations, Ballarat, in seven years we should get about 10 tons to the acre of bark. That is, off the trees that were fit for barking at that time, and at the rate—of the present rate of bark—it varies from £8 to £10 per ton.

"You would get 10 tons to the acre? Yes.

"From trees that have been how many years growing? Seven years.

"That would average £10 a ton? Yes, at the present,—and it is likely to be more.

"That is, £90 per acre? Yes.

"That will be about £13 per acre per annum? Yes.

"Would that take all the trees, or leave a portion remaining? No, only the first thinning out.

"How many thinnings would that plantation admit of year after year? For years and years to come, because you will find them in all stages of growth. But I calculated that from the first thinning-out.

"And would that yield as much each succeeding year? It would yield as much each succeeding year.

"So that you might get 10 tons per acre in each succeeding year? Annually for years to come, if they are judiciously thinned, but not as they are thinning (destroying) them in the forest. If they are properly cultivated—cultivated for profit.

"Can you mention any other crop grown in Victoria more profitable than that? No; and it is grown on such poor land, where neither grass nor anything will grow. In Rodney, where I mention, there is not a bit of grass to be seen, and there the wattles come up thick."

At the irrigation farm at Islington, near Adelaide, Mr. J. E. Brown planted 40 acres in wattles. "The seed was simply soaked in hot water and broad-casted, and the soil afterwards harrowed with a brush harrow; altogether, the whole expense of seed, preparation of the ground, and

putting the seed in cost about £15. Four years afterwards the wattles were simply thinned, and the bark of the thinnings realized £25, thus more than refunding the original outlay. Next year I hope the thinning will realize something like £3 per acre. In three years time from this we purpose stripping the whole crop, when I am certain it will realize at least £50 per acre."

## Detailed Estimates.

1. The following statement showing the profit to be derived from the systematic cultivation of wattles, was compiled from the evidence given before the Board of Enquiry on Wattle Cultivation, Melbourne, 1878, and forms an appendix to their report. (The Board recommend *A. decurrens** and *A. pycnantha*).

*Receipts derivable from a Wattle Plantation of say* 100 *acres, planted in the manner proposed.*

| | | | |
|---|---|---|---|
| Each acre planted with wattles, 10 feet apart, would carry 400 trees; at the end of fifth year, trees would yield say 56 lb. matured bark; stripping only every third tree 333 tons would be obtained off 100 acres; this, at £4 per ton, would give at first stripping ..... | £1,332 | 0 | 0 |
| In the sixth (or following) year, a similar number of trees would be stripped, the bark having increased in weight say 14 lb., the increased yield of second stripping would therefore be 400 tons at £4, making... | 1,600 | 0 | 0 |
| In the seventh year the remaining trees would be stripped, from which a still greater increase would be obtained, say 480 tons at £4, maknig ... | 1,920 | 0 | 0 |
| The aggregate yield of bark during the first eight years, 1,215 tons, amounting in value to ..... | £4,852 | 0 | 0 |

*Estimate of Expenditure on a Wattle Plantation of* 100 *acres during eight years.*

| | | | | | | |
|---|---|---|---|---|---|---|
| Rent of 100 acres for eight years, at 6s. per acre per annum | £240 | 0 | 0 | | | |
| Ploughing 100 acres in drills 10 feet apart ..... | 25 | 0 | 0 | | | |
| Sowing wattles and actual cultivation, including cost of seed | 37 | 10 | 0 | | | |
| Supervision for eight years, say, £10 per annum ..... | 80 | 0 | 0 | | | |
| Pruning the trees, taking off useless wood, &c. (only necessary for two years), 10s. per acre..... | 50 | 0 | 0 | | | |
| Incidental and unforeseen expenses..... | 27 | 10 | 0 | | | |
| Interest on the whole amount expended during eight years | 240 | 0 | 0 | | | |
| | | | | 700 | 0 | 0 |
| Actual cost of stripping and carting, as shown below* ... | £1,515 | 0 | 0 | | | |
| | | | | 1,515 | 0 | 0 |
| †Profit balance, exclusive of improvements or supplementary sowings..... | £2,637 | 0 | 0 | | | |
| | | | | 2,637 | 0 | 0 |
| | | | | £4,852 | 0 | 0 |

* The cost of stripping would not exceed 15s. per ton, on account of the facilities presented by the regularity of the trees, while carting would represent another 10s. per ton. These combined charges would be 25s. per ton, and on 1,215 tons would be £1,515, leaving a clear profit on 100 acres (after allowing for primary expenditure) of £2,637.

† In addition to the bark taken off the land, a fresh supply would be available in two years afterwards, as the Board recommend that every tree stripped should be replaced by another sowing. All improvement effected may be calculated as additional profit.

**A. decurrens* var. *mollis*=*A mollissima*, this so called variety having again been raised to the rank of a species. J.H.M.

| EXPENDITURE. | £ | s. | d. |
|---|---|---|---|
| To rent of land at 4d. per acre, under Wattle Cultivation Bill, at £1 13s. 4d. | 11 | 13 | 4 |
| To fencing, say, 1 mile and 3 quarters, at £40 per mile | 70 | 0 | 0 |
| To ploughing (and harrowing twice), at 14s. per acre | 79 | 0 | 0 |
| To purchase of seed, 1 lb. per acre, 100 lb., at 1s | 5 | 0 | 0 |
| To ploughing and burning off fire-breaks, four blocks of 20 acres each, with 20 feet roadway between each block, three furrows on each side, at £10 per annum | 70 | 0 | 0 |
| To vermin destruction, and unforeseen expenses, say | 50 | 0 | 0 |
| To first pruning and thinning at end of second year after sowing, say 10s. per acre | 50 | 0 | 0 |
| To final pruning about fourth year (superficial only), at 5s. per acre | 25 | 0 | 0 |
| To interest on seven years' rental ... ... ... £3 15 0 | | | |
| To interest on expenditure, say ... 206 10 10 | | | |
| | 210 | 5 | 0 |
| To stripping 100 acres of wattles (1,200 trees to the acre), producing 12 lb. of bark per tree, or 602 tons in all, at 25s. per ton | 807 | 10 | 0 |
| To cartage to a railway station, say 5s. per ton | 165 | 10 | 0 |
| | £1,534 | 18 | 4 |
| RECEIPTS. | | | |
| By 100 acres of wattle-bark from 1,200 trees to the acre, each producing 12 lb. of bark—642 tons, £7 10s. per ton | 4,815 | 0 | 0 |
| Less expenditure | 1,534 | 18 | 4 |
| Profit | £3,281 | 18 | 4 |

TABLE to aid in the comparison of the more important items contained in the three foregoing estimates.

A.—OUT-GOINGS.

| | Victorian Board. | Mr. Brown. | Mr. Perrin. |
|---|---|---|---|
| Cost of land per acre | ..... | £3 | ..... |
| Rent per acre per annum | 6/- | ..... | 4d. under Wattle Cultivation Bill. |
| Fencing, per mile | ..... | £50 | £40 |
| Ploughing | £25 | £40 | £79 (includes harrowing). |
| Scarifying, per acre | ..... | 4/- | ..... |
| Fire breaks | ..... | £25 | £70 (fuller specification). |
| Seed and sowing | £37/10/- | £26/10/- | £5 (seed only). |
| Pruning, &c., per acre | 10/- | 10/- | 10/- |
| Stripping, per ton | 15/- | 25/- | 25/- |
| Carting, per ton | 10/- | 10/- | 5/- |
| Supervision for eight years | £80 | ..... | ..... |
| Interest on money | £240 (8 years) | £280 (7 years) | £210 5/- (7 years). |
| Contingencies | £27/10/- | £50 | £50 |

B.—INCOME.

| | Victorian Board. | Mr. Brown. | Mr. Perrin. |
|---|---|---|---|
| Yield of 5th year trees, each | 56 lb. | 10 lb. from each tree, admittedly a low estimate. | 12 lb. |
| ,, 6th ,, ,, | 70 lb. | | |
| ,, 7th ,, ,, | 84 lb.* | | |
| Value of bark, per ton | £4 | £5 | £7/10/- |
| Total yield in tons | 1,215 (8 years) | 500 (7 years) | 642 (7 years). |

* An extravagant estimate, except for picked trees. Every third tree stripped.

# Wattle-Barks in General.

## (a). TIME OF YEAR FOR STRIPPING.

Wattle-barks are often gathered all the year round, whereas they should only be stripped for three or four months in the year; (the months recommended are September, October, November, and December)* out of that season there is usually a depreciation of tannin in the bark. In these months, also, the sap usually rises without intermission, and the bark is easily removed from the tree. The impression appears to have prevailed amongst bark-strippers that whenever the bark would strip it possessed full tanning properties, but this is erroneous. After a few days of rain during other seasons of the year, a temporary flow of sap will cause the bark to be easily detached from the trunk, but then it is greatly inferior in quality. *(Report Victorian Board).*

Mr. A. L. Thrupp, in a paper read in March, 1890, before the Congress of Agricultural Bureaux in Adelaide, carefully warns tanners and others against receiving wattle-bark damp, pointing out that bark in that state engenders mould "of a most virulent form," is liable to spontaneous combustion if stacked in the hold of a vessel, and, while bark received green will tan hides as fast as bark received dry, still, there is the undeniable fact, in nine cases out of ten, that leather produced from bark so received, so stacked, and used for tanning purposes is spotted, and therefore of second rate or third rate value.

Apart from the intermittent supply already alluded to, it is owing to the greedy and indiscriminating way in which wattle-bark has been gathered, and the moist condition in which it has often been shipped, that purchasers in England, finding the quality variable, have not entered into its regular employment as largely as might have been expected.

It should be purchased in the stick or bundle. "In this form its quality can be more readily judged; but when the supply of mature trees became diminished, nearly all the bark was chopped or ground prior to shipment, good and inferior being bagged together."

Mr. Thrupp states that if the bark of a wattle-tree of three or four years be slit down on the south side with a sharp knife, from root to first branch, the increase in the bulk of the bark will be considerable. This has been tried in the Montacute District of South Australia successfuly for years. Spring is the proper time for this work. (*Journal, South Australian Bureau of Agriculture*, November, 1889.) A correspondent of mine, engaged in wattle cultivation in the Blue Mountains, has also practised this method with success. He has instituted comparative experiments, and is convinced of the advantage of the process in increasing bulk of bark. He performs the operation in the early winter (May or June).

The best wattle-barks contain comparatively little fibre. A good bark will, as a rule, grind to an impalpable powder, while one which with the same treatment forms a fibrous substance is, as a rule, to be avoided. I have not, however, come to any conclusion with respect to the connection between percentage of tannic acid and fibre.

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* No fixed time, applicable to all parts of New South Wales and to varying seasons, can be given. Farmers and others will have to find the best time from their own experience, supplemented, of course, by assays of bark stripped at various periods.

### (b). AGE AND SIZE OF TREES.

Wattle-bark should only be procured from mature trees, *i.e.*, from those whose bark possesses the full natural strength. The Victorian Board states, as has already been noted, that bark-stripping may profitably commence at the end of the fifth year, and returns undoubtedly commence not latter than this period. Mr. J. E. Brown strips his wattles at about 6 years of age, but the exact period can only be decided by the cultivator's common sense. Mr. A. Bucknall mentions that wattle trees mature in seven years in the Majorca plantation, Ballarat. Mr. W. Ferguson of Victoria makes the general statement that none should be cut under 5 inches in diameter,—a reasonable suggestion which might be enforced, on Crown lands, by legislative enactment.

Some people fell their wattles before stripping, and use the wood for firewood. Bark-strippers as a rule leave about a third of the bark on the tree, besides leaving unsightly dead trees. It should also be borne in mind that dead and decaying trees are a source of danger to the plantation, owing to the harbour they give to insect pests. The matter of utilizing the bark on the twigs, &c., will be alluded to below.

Mr. Thrupp states, as his experience, that greater weight of bark can be produced in five years when cultivated, as against 8 year old bark grown in its natural state (*Journ. S. A. Bureau Agric., April*, 1890). It is to be hoped that farmers and others will institute some experiments with the view to estimate the improvement in quantity and quality of wattle-bark under cultivation, but such experiments, to be conclusive, must have the data carefully checked, in order to make sure that the comparisons of wild and cultivated trees are as fair as possible.

### (c). EXPORT, PACKING, &c.

In regard to the preparation of bark for export, the following letter from a well-known London firm of brokers, which appeared in the *Leather Trades' Circular and Review* of the 8th March, 1887, is valuable:—

"In reply to a question as to the best form in which to ship mimosa (wattle) bark, we beg to state that the trade, as a rule, prefer it ground, so long as they can be sure it is not adulterated. Some few, however, cannot be satisfied unless they grind it themselves. We should recommend shipments of well ground, with a few parcels chopped or crushed in *bags*, but as we know that freight is heavier on the latter, and buyers expect a reduction of from 10s. to 20s. per ton to cover cost of grinding, the former will generally be most satisfactory to shippers. We think that the strength is better preserved in the chopped than in the ground, but there is nothing we can suggest as an improvement on the best standard marks of Adelaide ground. If shipments of chopped be made, it should on no account be shot loose in the ship's hold."

Barks are sent into commerce in one or more of four forms:—

1. In the bundle.
2. Chopped, *i.e.*, into pieces a few inches in length.
3. Ground, forming a substance something like "tow;" and
4. Powdered, that is of course, if the bark is not too fibrous to permit of this being done. It is not desirable to push the process of grinding too far, as wattle-bark is no exception to the generality of powders, in forming "balls" when thrown into water when too finely ground.

The preparation of extracts causes an immense saving in freight, but an extract is chiefly valuable in that it enables us to utilize everything. The following is an account of a process as carried on in South Australia a few years back, and is suggestive:—"Messrs. Barrow and Haycroft have established, at Echunga, a manufactory of tannage, which, from the methods employed, is almost pharmaceutical. About 10,000 tons of wattle-bark are sent annually from South Australia alone, and it is calculated that the waste in stripping is about four times this amount. The new factory converts the branches, too small to pay for stripping, into a strong fluid extract called tannage, which contains water 60 per cent., and soluble tannin 38·2 per cent., according to an analysis by Mr. G. H. Hodgson of samples from the first 80 tons recently shipped to England. The wattle 'trash' yields 12 to 16 per cent. of tannage. Two men can often cut and load 5 tons, and the waggons can bring in two loads a day, equal to 5 or 6 tons; and at the price (£1 a ton) which the firm is paying for thinnings and tops and branches, so much is offering that the patentees are obliged to distribute their order. The trash is tied up in large bundles and carted into the factory. It is there weighed, close beside the machine which cuts it up into 'chaff.' This machine is very much like an ordinary steam-plane, the chisels revolving at a high speed, and cutting through 2½-inch saplings quite readily. The chips are shovelled into large wooden hoppers, into which steam is introduced from a large Cornish boiler. There are three steam-heated vats, and the liquor is transferred from one to the other, pumped into elevated tanks, and thence allowed to flow from a tap on to steam-heated evaporating pans, about 30 or 40 feet in length. The evaporation is so rapid that in traversing the pans from the one end to the other the liquid is converted into a thick, tenacious, treacly extract. At the end of the pans it flows into a cistern, and thence by a kind of treacle-gate into the casks, each of which will hold about 10 cwt. All that now remains to be done is paste on a label, put in a bung, weigh the cask, and send it off to market. In the process of evaporation a certain portion of the tannic acid is destroyed. The plant can be easily moved from place to place. It does not pay to cart the trash far, but a few square miles of wattle country will keep a factory going. The utilization of thinnings allows the cultivation of the tree thickly on waste ground, and to begin cutting the third year. European tanners are quite accustomed to the use of such extracts, but it is said that it will be very hard to introduce it into the colonial tanneries."—(*Chemist and Druggist*, 1886.)

I believe that these works are now working with diminished output, as the extract was found to contain too much mucilage, and therefore did not find favour with the tanners. Wattles are rich in gum and mucilage, and some cheap process, which will get rid of these substances and leave the tannic acid uninjured, is a desideratum.

The preparation of wattle-bark extract is no new thing.

"The first shipment of tanning was made from Sydney to England as far back as 1823, in the shape of an extract of the bark of two species of mimosa (*Acacia*), which was readily purchased by the tanners at the rate of £50 per ton. One ton of bark had produced 4 cwt. of extract of the consistency of tar.*

"In 1843, 3,078 tons of mimosa bark were shipped from Port Phillip to Great Britain. The price then realized in the London market was £12 to

* See also a paper "On the Export and Consumption of Wattle-bark, and the process of Tanning," by James Mitchell (*Proc. R.S. Van Diemen's Land*, 1851). The subject of Extracts is here dealt with.

£14 per ton, but it has since (1854) declined to £8 a ton. The price of chopped mimosa bark in Australia, for export, at the close of 1846, was £2 5s. a ton. Bark valued at £912 was exported from Van Diemen's Land in 1848.

"The imports of mimosa bark have only been to a limited extent within the last few years, reaching 350 tons in 1850, against 110 tons in 1849, 230 tons in 1848, and 600 tons in 1847. The prices realized were £10 to £11 for chopped, £12 to £12 10s. for ground, and £8 to £9 per ton for unchopped bark. Whilst the imports were 3,900 tons in 1844, they dwindled to less than 400 tons in 1850. (Simmonds' "Commercial Products of the Vegetable Kingdom," 1854.)

In the instructions given (1821) by the Admiralty to Sir James Ross, when proceeding on his Antarctic expedition, his attention was particularly drawn to the astringent substances adapted for tanning, and to the various extracts of barks, &c., imported into England from the Australian Colonies, and which are employed by the tanner.

The quotations I have made have not historical interest merely; they show how in time past as well as now, distant countries have been only too glad to get our wattle-bark, but local requirements must first be met, and since we have abundance of hides, the value of an abundant supply of wattle-bark to the Australian Colonies can scarcely be overrated.

# The Various Kinds of Wattle-Barks.

(GOOD, BAD, AND INDIFFERENT.)

I HAVE already referred to the fact that in Australia the term "wattle" is applied to species of *Acacia*. Acacias are very largely developed in this continent, there being about 312 of them, of which New South Wales boasts 102, and a fresh one is occasionally discovered. The barks of all are more or less astringent, owing to the tannic acid they contain, but most of them are useless to the tanner, for three reasons—they are either of too small a size to strip profitably, their bark is too weak in tannic acid, or they are not sufficiently abundant. Nevertheless a number are more or less useful, and the object in furnishing the specific information in regard to each wattle which follows is threefold, viz.,—to give information in regard to the percentage of tannic acid in those barks already used by the tanner, to draw his attention to other barks worthy of notice, and to put him on his guard* in regard to what, for his purpose, may be termed worthless species. Most of the analyses given are my own, and refer chiefly to New South Wales barks; I hope, however, to be able to add analyses of the wattle-barks of the other colonies from time to time.

The species are true to name, herbarium specimens having been collected in most instances where analyses are given. The local names are also made as complete as possible. Altogether it is the most comprehensive catalogue of wattle-barks which has been published up to the present time.

*I am quite aware that some of the barks are so worthless that it would be ridiculous to suppose that any tanner would ever dream of using them.

A number of analyses are now published for the first time. They are by Löwenthal's improved process. Partly through the kindness of friends, and partly through the energy of the Museum Collector, there is in the Technological Museum the most extensive collection of wattle-barks I know of any where. I have collected many with my own hands.

They are listed in botanical order, since this has the advantage of bringing closely related wattles together. There is a full index and also tables at the end to facilitate reference. It will become evident to the reader who bestows a moment's reflection on the subject that it is impossible for me to arrange these wattles under their local names, for the reason that some have several names, while the same name, also, is occasionally held by several. As this little book is primarily intended for non-botanists, I regret I have no alternative but to give what appears to be most prominence to the botanical names.

1. *Acacia colletioides*, A. Cunn., B.Fl.,* ii., 325. "WAIT-A-WHILE" (a delicate allusion to the predicament of a traveller desirous of penetrating a belt of it).

Some bark from a very old shrub was examined by the author, and yielded 10·56 per cent. of extract, and 4·4 per cent. of tannic acid† (*Proc. R.S., N.S.W.*, 1887, p. 87). It consisted of little more than fibre. This is a dry country wattle, and the most favourable specimen of it is not likely to be of use to the tanner, since apart from its small percentage of tannic acid it is but a shrub.

New South Wales, Victoria, South and Western Australia. In the two first colonies, at any rate, it is not found in the coast districts.

2. *Acacia siculiformis*, A. Cunn., B.Fl., ii., 329.

A tallish shrub merely. The bark not to be distinguished from that of *A. pravissima* (page 24). I have analysed (April, 1890), a sample of bark from Jindabyne, Snowy River, N.S.W., collected January, 1890; height, 6 to 10 feet; diameter, 1 to 4 inches; grown on granite soil. It contains 7·87 per cent. of tannic acid, and yields 31·85 per cent. of extract.

Found in the mountains and high table-lands of New South Wales (southern), Victoria, and Tasmania.

3. *Acacia tetragonophylla*, F. v. M., B.Fl., ii., 330. "DEAD FINISH."

A sample of this bark from Tarella, Wilcannia, N.S.W., from a tree whose height was 10 to 12 feet and diameter 6 to 8 inches, was examined by the writer (*Proc. R.S., N.S.W.*, 1888, p. 267), and gave 14·96 per cent. of extract and 5·59 per cent. of tannic acid. It was collected August, 1887, and analysed August, 1888. This is one of the usual dry-country wattle-barks, consisting almost entirely of bundles of fibre, even the hoary outside bark being more or less readily separable into long ribbons.

A western and desert species occurring in New South Wales, Victoria, South Australia, and Queensland, not found in the coast districts, nor, I believe, in the mountain ranges. Its chief habitat is the country west of the Darling.

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* B.Fl. signifies "Bentham's Flora Australiensis," and the references given are of the places at which botanical descriptions of the various wattles may be obtained.

† *Important memorandum.*—The analyses given are all calculated on the bark dried at 100° C., the only way in which uniform results can be presented.

4. *Acacia rigens*, A. Cunn., B.Fl., ii., 337. "NEALIE," or "NEEDLE BUSH."

Bark from an old tree, from near Hay, N.S.W., yielded the author 19·05 per cent. of extract, and 6·26 per cent. of tannic acid. (*Proc. R.S., N.S.W.*, 1887, p. 88.)

It consists of but little else than layers of fibre. A dry-country wattle. South Australia, Victoria, and New South Wales.

5. *Acacia calamifolia*, Sweet, B.Fl., ii., 339. "WILLOW" or "BROOM WATTLE." "Wallowa" of the aboriginals of Lake Hindmarsh Station (Victoria).

A sample of bark is in the Technological Museum, received in the year 1883, was stated to contain 20·63 per cent. of tannic acid, according to an analysis by Mr. Thomas, of Adelaide. It was labelled "*A. calamifolia*." I analysed this bark, which came from the Murray Flat Ranges, South Australia, and found it to contain 36·06 per cent. of tannic acid, yielding no less than 63·1 per cent. of extract. It is nearly $\frac{5}{16}$ of an inch thick, solid, smooth, containing very little fibre, and hardly to be distinguished from *A. pycnantha* bark. I received it, however, under the name by which I now describe it, and the tree is not personally known to me.

The bark is a superb one. As to the discrepancy between my analysis and that of Mr. Thomas, I can state that I have proved that barks stored in a dry place increase in percentage of tannic acid; but what that percentage is, or whether any generalization can be made, my experiments hardly yet warrant me in stating. Mr. Thomas' figures may have been based on a very different sample of the parcel to that which has come into my hands, but what the percentage of tannic acid was in my particular specimen in 1883, can only be guesswork. My analysis was made April, 1890. I draw attention, in this context, to the footnote at page 16, in regard to my analyses all being calculated on the bark freed from moisture.

I received this particular bark from a firm of the highest reputation, and I am confident that no transposition of labels has occurred in this Museum. So far as I know, *A. calamifolia* does not attain a size sufficient to yield bark similar to that under examination, and I trust that correspondents will kindly enable me to state the proper position of *A. calamifolia* as a bark-yielding wattle.

*A. calamifolia* is recorded from South Australia, Victoria, and the extreme west of New South Wales.

6. *Acacia verniciflua*, A. Cunn., B.Fl., ii., 358.

This small tree (height, 20 to 25 feet, with a diameter of 2 to 5 inches), exudes a sticky substance from the leaves, hence the specific name. The bark reminds one irresistibly of cascarilla bark. It is full of fibre, and of no use to the tanner. A specimen collected in April, 1889, on the Delegate River, N.S.W., in granite country, was analysed by me the following April, and found to yield 22·35 per cent. of extract, and only 3·16 per cent. of tannic acid.

Found in New South Wales, Victoria, South Australia, and Tasmania, chiefly on mountains and high table-lands. In the south-east in such situations it does not extend further north than the Bombala District; out west it was found both by Cunningham and by Mitchell.

7. *Acacia sentis*, F.v.M., B.Fl., ii., 360.

A specimen of a dirty grey scaly bark, $\frac{3}{8}$ of an inch thick, from Ivanhoe, N.S.W., yielded the author 18.02 per cent. of extract, and tannic acid 6·32 per cent. (*Proc. R.S., N.S.W.*, 1887, p. 29.)

A second sample from Cobbam Lake, Milparinka, N.S.W., was analysed by the author, August, 1888. (*Proc. R.S., N.S.W.*, 1888, 268.) Tree, height 15 to 20 ft., diameter 4 to 6 inches, collected, August, 1887. It yielded extract 33·82 per cent., tannic acid 10·26 per cent. This bark would scarcely be taken for the product of a dry country wattle. It is from a younger tree to that already described, and is almost perfectly smooth and of a light brown colour. The collector reports "when fresh it is of a beautiful bright green colour, much like the bark of *A. decurrens*. I have found it easier to strip than any other bark I have stripped yet out west." It is very compact. Average thickness, $\frac{1}{8}$ inch.

An inland, desert species. In all the colonies except Tasmania.

8. *Acacia falcata*, Willd., B.Fl., ii., 361. Called "BASTARD MYALL," in the Braidwood District, N.S.W. It also goes by the names of "Hickory," "Sally," and "Lignum-vitæ." It was formerly the "Wee-tjellan" of the aboriginals of Cumberland and Camden, N.S.W. (Macarthur.)

It is said to yield a good tanning bark, but it is usually of rather small size and not likely to be of importance to the tanner.

On the coast districts, and on to the dividing range, in New South Wales and Queensland; its farthest southern locality is the Shoalhaven River.

9. *Acacia penninervis*, Sieb., B.Fl., ii., 362. A "BLACKWOOD," usually called "Hickory" or "Mountain Hickory," from Braidwood to the Victorian border.

The bark contains 17·9 per cent. of tannic acid, and 3·8 per cent. of gallic acid. (Mueller.) The following analysis is given by the Queensland Commissioners, Colonial and Indian Exhibition, 1886:—Tannin, 14·49 per cent.; extract, 33·06 per cent. Specimens from Monga, near Braidwood, N.S.W., yielded the author (*a*) from the bark of the twigs, 22·88 per cent. of extract, and 16·24 per cent. of tannic acid; (*b*) from the bark of the trunk, 45·5 per cent. of extract, and 16·96 per cent. of tannic acid. The trunk-bark is smoothish, of a dirty brown colour; average thickness $\frac{3}{8}$ inch. The outer bark peels off in scales; the bark is very fibrous. The bark of the branches is smoother than that of the trunk, yet not perfectly smooth, is of a dirty grey colour, and $\frac{1}{16}$ inch in thickness. (*Proc. R.S., N.S.W.*, 1887, 30.)

The following bark of the same species is so different from the preceding that I describe it in detail. It is a practical illustration of the variability in appearance and composition of some wattle-barks, and shows the necessity of supplying the fullest particulars in regard to barks, where it is desired that full information in regard to what is already known of any given species of wattle may be afforded. This sample was collected at Brown's Camp, Delegate, N.S.W., in April, 1889, and analysed the following April. The trees were from 30 to 60 ft. high, with the large diameter of 1 to 2 ft. They grow in granite soil. My samples yielded 55·2 per cent. of extract with the excellent result of 34 per cent. of tannic acid. This bark is over $\frac{3}{4}$ inch thick, and therefore one of the thickest wattle-barks I have seen. The outside is rugged, almost like an ironbark, but the bark cuts solid, contains comparatively little fibre, analysis shows it to be one of the richest in tannic acid, while the trees are abundant and attain a large size. I recommend this tree

*Acacia penninervis*

(32°85-80(a1)) *Hickory or Mountain Hickory*

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SYDNEY, NEW SOUTH WALES.

to the earnest attention of tanners in New South Wales, and figure it particularly because it has come to my knowledge that in parts of Southern New South Wales it does not appear that the bark has ever been stripped and tried, because people do not look upon it as a wattle!

The mature trees which yielded the excellent result to which I have made allusion must have each contained half a ton of bark. They grew on a mountain side sloping west, on poor soil, and associated with the native cherry (*Exocarpus cupressiformis*), also of extraordinarily large dimensions. The tree is, of course, usually of smaller size, but it is in the highest degree improbable that Brown's Camp is the only New South Wales locality for the best specimens.

Found in New South Wales, Victoria, Queensland, and Tasmania. In New South Wales and Victoria it is chiefly a highland and mountain species.

10. *Acacia retinodes*, Schlecht., B.Fl., ii., 362.

Said to yield a good tan-bark.
South Australia and Victoria.

11. *Acacia neriifolia*, A. Cunn., B.Fl., ii., 363. A "BLACK WATTLE."

The following analysis of the bark is given by the Queensland Commissioners, Colonial and Indian Exhibition, 1886:—Tannin, 13·91 per cent.; extract, 17·87 per cent.

New South Wales and Queensland. On river banks and mountains in the coast districts from the Clyde River, in Southern New South Wales, to South Queensland.

12. *Acacia saligna*, Wendl., B.Fl., ii., 364. "WEEPING WATTLE."

In South-west Australia it is the principal source of tan-bark, and is said to contain nearly 30 per cent. of tannic acid. It is a small tree, common in most parts of extra-tropical West Australia, at least towards the coast. (Mueller.)

13. *Acacia pycnantha*, Benth., B.Fl. ii., 365. The "BROAD-LEAVED WATTLE" of South Australia; called also "Golden, Black, or Green Wattle." It was known under the name of "Witch" by the aboriginals of Lake Hindmarsh Station, Victoria.

One of the richest tanning barks in the world; a richer may exist, but I do not know of it. A sample of this bark was received by me in 1883 from Messrs. F. Pflaum & Co., of Blumberg, South Australia, with the note "contains 33·5 per cent. of tannin, according to Mr. Thomas, of Adelaide." I analysed the sample in April, 1890, and obtained the following extraordinary result by Löwenthal's improved process—the process I always adopt, viz.:—

| | | |
|---|---|---|
| Tannic acid | ... | 46·47 per cent. |
| Extract | ... | 74·7 „ |

This has been stored seven years in the Museum, and has doubtless increased in percentage of tannic acid during that period. Nevertheless it is the grandest specimen of wattle-bark I have ever examined. It is smooth, a model of compactness, contains a minimum of fibre, and therefore powders splendidly, is of good colour, and an excellent bark in every way. South Australia has practically the monopoly of this bark, and it is a grand heritage,—the envy of the eastern colonies.

A second sample forwarded to me April, 1890, and analysed the same month, is from the vicinity of Mount Torrens, 20 miles east of Adelaide, and was obtained from Mr. J. E. Brown, Conservator of South Australian Forests, through the courtesy of Mr. Albert Molineux, Secretary of the Agricultural Bureau of that Colony. It yielded 39·1 per cent. of tannic acid, with 73·5 per cent. of extract. It is of course an admirable bark, but it is thinner than the preceding sample, and would at once strike an expert, even from visual examination, as second to it. But even this contains nearly 3 per cent. of tannic acid more than any other sample of wattle-bark of other species I have examined. It is, however, only fair to say that I have been unable to procure samples of the best brands of Tasmanian bark.

In forwarding the sample, Mr. Molineux says,—"The bark was taken from a height of about 2 feet above ground. It was from a large tree, of which there have been, and still are, great numbers in the locality. Mount Torrens District is the best in the Colony for rich good bark, and the Conservator has in hand upwards of 30 *tons of seed* from these, some of which is for sale."

One pound of plump South Australian seed of this wattle contains, according to a careful determination under my own supervision, 23,808 seeds, so that cultivators may reckon safely on 20,000.

The following are results of analyses of thirteen samples of *A. pycnantha* bark received from Mr. J. E. Brown. They were stripped 29th April, 1890, analysed a month later, and were grown on the Government Farm, Belair, S.A. Height of trees, from 8 to 14 feet.

| No. | Age, Diameter, and part of Tree from which taken. | Per-centage of Tannic Acid. | Per-centage of Extract. | Geological Formation, Soil, &c. |
|---|---|---|---|---|
| 1 | From butt of tree; diameter, 3½ in. (Age, about 5 years.) | 37·5 | 63·9 | Nos. 1 to 7 are taken from trees growing in an uneven basin, between the lower and upper ranges; soil, light sandy loam over gravel wash and yellow clay. |
| 2 | From limb of No. 1 | 33·75 | 63·25 | |
| 3 | From butt of tree; diameter, 2 in. (Age, 4 years.) | 28·5 | 57·75 | |
| 4 | From butt of tree; diameter, 1⅞ in. (Age, 3 years.) | 36·25 | 68·35 | |
| 5 | From butt of tree; diameter, 2 in. (Age, 4 years.) | 36·5 | 64·25 | |
| 6 | From butt of tree; diameter, 2½ in. (Age, 4 years.) | 37·5 | 65·35 | |
| 7 | From limb of No. 6 | 32·95 | 63·25 | |
| 8 | From butt of tree; diameter, 4½ in. (Age, 5 years.) | 37·25 | 64·5 | No. 8, from the S.W. slope of the upper ranges; soil, light clay over bed rock of hard sandstone. |
| 9 | From limb of No. 8 | 38·5 | 66·2 | |
| 10 | From butt of tree; diameter, 2 in. (Age, 4 years.) | 35·95 | 63·4 | No. 10, from the top of upper range; soil, about 2 in. of light sandy loam over bed rock of hard sandstone. |
| 11 | From limb of No. 10 | 32·1 | 63·1 | |
| 12 | From butt of tree; diameter, 3 in. (Age, 5 years.) | 35·5 | 64·85 | No. 12, from N.E. slope of upper range; soil, same as No. 10. |
| 13 | From butt of tree; diameter, 4 in. (Age, 7 years.) | 35·45 | 63·5 | No. 13, same as No. 8. |

(5a* 5a-50(b))

Acacia pycnantha

South Australian Golden or Broad-leaved Wattle.

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SYDNEY, NEW SOUTH WALES.

It will be noticed that in three cases, Nos. 2, 7, and 11, the results of analysis are slightly lower than that of the bark gathered from the butt of the same tree, but in the case of No. 9 the result is slightly higher, the appearance of the bark when powdered, of No. 8, was too dark to be first class, while that of No. 9 was the best of the whole thirteen samples, and gives the best result.

The powder from the bark of the limb is generally of a lighter colour than that taken from the butt, although the powders of Nos. 5, 10, and 12 were very light for bark taken from the trunk of the tree.

The bark of No. 3 was not first class, being far too fibrous.

In Part III of the *Forest Flora of South Australia*, by J. E. Brown, the following analyses of this bark by Mr. G. A. Goyder, Superintendent of the Crown Lands Laboratory at Adelaide. The localities are all South Australian.

| Locality where grown, elevation, &c. | Character of soil upon which grown. | Age of tree. | Weight of bark from each tree. | Thickness of bark. | Portion of tree from which taken. | Percentage of tannin. | Total extractive matter. |
|---|---|---|---|---|---|---|---|
| | | Yrs. | lbs. | in. | | | |
| Government Farm— | | | | | | | |
| Belair, elevation | Sandy loam, with | | | | trunk wood | 34·0 | 55·3 |
| 1,000 ft. ..... | clay sub-soil ... | 6 | 45 | 0·22 | and | 5·1 | 20·5 |
| Do ..... | do ... | 6 | — | — | bark of twigs. | | |
| Torrens Island— | | | | | | | |
| Almost sea-level..... | Deep sandy soil .. | 5 | 38 | 0·23 | Trunk ..... | 25·2 | 46·5 |
| Do ..... | do ... | 5 | — | 0·04 | Twigs..... | 21·7 | 40·8 |
| Bundaleer Forest— | | | | | | | |
| Elevation, 1,800 ft.. | Ferruginous loam, with clay sub-soil..... | 7 | 128 | 0·20 | Trunk ..... | 31·4 | 49·9 |
| Do ... | do ... | 7 | — | 0·05 | Twigs..... | 22·3 | 45·6 |
| Semaphore— | | Abt. | | | | | |
| 20 ft. above sea-level | Deep sand..... | 30 | 307 | 0·18 | Trunk ..... | 25·8 | 42·6 |
| Brighton— | | | | | | | |
| 20 ft. to 30 ft. above sea-level ..... | Clay soil ..... | 6 | — | 0·21 | Trunk ..... | 28·7 | 53·4 |
| Do ..... | do ..... | 6 | — | 0·03 | Twigs..... | 25·3 | 41·6 |
| Mount Gambier..... | Calcareous sand .. | 7 | — | 0·13 | Trunk ..... | 31·7 | 52·0 |

I am of opinion that these analyses rather under-rate the value of *Acacia pycnantha* bark, but this is of course erring in the right direction.

Mr. J. E. Brown, of South Australia, who is probably the greatest expert on wattle cultivation that we have, has gone in for this species very largely in districts found suitable for it, and his general remarks on wattle cultivation (*ante*) were chiefly written with this species in view.

"Except in very dry localities, this species is common to nearly all districts of South Australia north of Encounter Bay, and is occasionally to be met with along the coast from Kingston to the Glenelg River. Its principal habitat, however, and the one where the thoroughly typical botanical form

and the largest trees of the species are found, is in the Adelaide hills and plains, from Encounter Bay to Clare. For propagation purposes seed should, if possible, be obtained from trees grown within these limits. In some parts of the north of the Colony there is a narrow-leaved variety, with the stem and branches covered with a whitish substance, which is desirable should not be propagated, as the tree is of slow growth, and does not attain payable dimensions." (J. E. Brown. Reports.)

Average height of typical form 20 to 25 ft., and diam. 6 to 10 in. (Brown.)

Mr. Brown gives the life of this tree at from ten to twelve years, and states that it may be stripped from the sixth to the ninth year, according to circumstances. It lives longer in sandy soils than in clay ones.

Mr. G. S. Perrin summarises the advantages of this species over *A. decurrens* by stating that the former species is more amenable to culture, and can be pruned to a better shape, occupies less space in the plantation, and is much better stripped.

Baron Mueller (*Select Extra-tropical Plants*) says:—"This tree, which attains a maximum height of about 30 feet, is second perhaps only to *A. decurrens* in importance for its yield of tanners' bark; the quality of the latter is even sometimes superior to that of the black wattle (*A. mollissima*), but its yield is less, as the tree is smaller and the bark thinner. It is of rapid growth, content with almost any soil, but is generally found in poor sandy ground near the sea-coast, and thus also important for binding rolling sand."

In an earlier portion of this work I have gone into the question of soil, &c. Generally speaking, it loves a warm climate, with only a moderate rainfall. It therefore will not usually flourish at elevations over 2,000 ft.

I have already dealt with the matter of localities. It is essentially a South Australian species, though it extends into both Victoria and New South Wales.

14. *Acacia amœna*, Wendl., B.Fl., ii., 366.

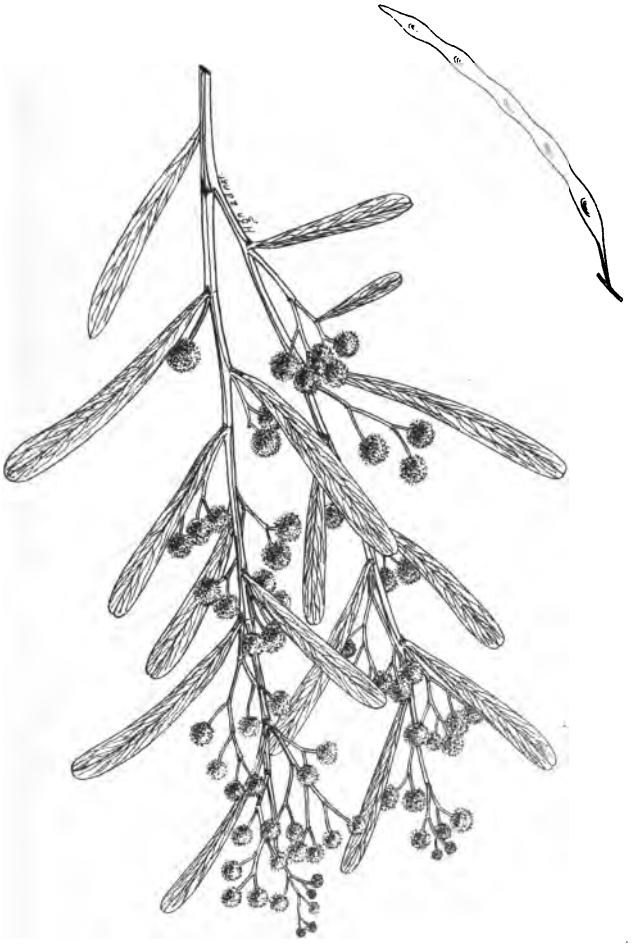
This tall shrub yields a good bark, which would be valuable if it were of large size. As it is, the dried bark is of the size of cassia-bark or coarse cinnamon. It is smooth, and yields a pale-coloured, rather fibrous powder. A sample from Tantawanglo Mountain, near Candelo, N.S.W., from shrubs 8 to 12 feet high, with a diameter of 2 to 4 inches, and grown in granite soil, afforded 45·85 per cent. of extract and 23·5 per cent. of tannic acid. It was collected July, 1889, and analysed April, 1890.

Found in New South Wales and Victoria; a coast and mountain species. Its most northern limit in the former Colony appears to be the Moruya District.

15. *Acacia salicina*, Lindl., B.Fl., ii., 367. "Cooba," or "Koubah." "Native Willow." "Motherumba."

Following is a condensed account of the analyses of two specimens of this bark recorded by me in *Proc. R.S., N.S.W.*, 1888, 268:—

*a*. Tarella, Wilcannia.—Height, 20 to 25 feet; diameter, 12 to 18 inches. Collected August, 1887; analysed August, 1888. A coarse, flaky bark, not so fibrous, more compact, and altogether more promising looking than most of the dry-country barks. Average thickness, up to ¾ inch. Extract, 35·28 per cent.; tannic acid, 13·21 per cent.



*Acacia salicina*
*Cooba or Native willow*

5a 83-90.(c)

*b.* Momba, Wilcannia.—Height, 30 to 40 feet; diameter, 12 to 18 inches. Collected August, 1817; analysed September, 1888. Not flaky on the outside like No. 1, but a harder, bonier bark, more rugged, but obviously a promising bark. Thickness, up to 1 inch. Extract, 33·1 per cent.; tannic acid, 13·51 per cent.

A sample of this bark, from the Lachlan River, New South Wales, *viâ* Hay, which has been in the Technological Museum 5 years, is a good specimen of this bark, being fairly smooth, close, compact, and containing comparatively little fibre. It was analyzed May, 1890, and found to contain 32·75 per cent. of extract, and 15·1 per cent. of tannic acid.

This species is undoubtedly worthy of conservation, and even culture, in the dry interior when it is found, particularly as the barks there are usually so poor in tannic acid. The blacks are aware of the value of this tan-bark, as they use it for tanning wallaby and other skins.

An interior species, found in all the colonies except Tasmania. Habitat, chiefly on banks of creeks and water-courses.

16. *Acacia prominens*, A. Cunn., B.Fl., ii., 371. Reduced by Baron von Mueller to a variety of *A. linifolia*, Willd.

This is called "Grey" and "Black Wattle" near Sydney, but dealers will not have it, and it hardly pays to cut up and pass with better bark. A sample of a black bark, stained, leopard-like, with whity-green patches, and bearing lichens, yielded the writer 18·03 per cent. of tannic acid, and 42·35 per cent. of extract. It was from Penrith, N.S.W.

A sample from Penshurst, Illawarra line, near Sydney, gave the author (*Proc., R.S., N.S.W.*, 1888, p. 269) 39·98 per cent. of extract, and 14·42 of tannic acid. Height of tree, 10 to 15 feet; diameter, 1½ to 2 inches; collected September, 1887; analysed August, 1888. A light-coloured bark, very thin, of the thickness of stout brown paper, and reminding one strongly of that of *A. longifolia*. As this was but from a sapling, the Penrith bark gives a fairer criterion of the value of bark of this species.

Found in Victoria, New South Wales, and Queensland. On the Snowy Mountains it occurs at elevations from 4,000 to 5,000 feet. It is an eastern species, found principally in the coast districts.

17. *Acacia podalyriæfolia*, A. Cunn., B.Fl., ii., 374. Sometimes called "Silver Wattle."

The bark is used in tanning, giving a light colour to leather. The following analysis is given by the Queensland Commissioners, Colonial and Indian Exhibition, 1886:—Tannin, 12·40 per cent.; extract, 29·50 per cent. (Bailey).

Northern New South Wales and Queensland.

18. *Acacia vestita*, Ker, B.Fl., ii., 375.

Bark from near Bombala, N.S.W., yielded the author 50·82 per cent. of extract, and 27·96 per cent. of tannic acid (*Proc. R.S., N.S.W.*, 1887, p. 89).

It grew on limestone country, and was from a tree 18 inches in diameter. Analysis of a second sample from the same district gave an even better result, viz.:—64·51 per cent. of extract, and 33·2 per cent. of tannic acid. This is very similar in appearance to the bark of *A. decurrens*, for which it might be substituted without detriment. It is a most useful bark, but,

unfortunately, not of wide distribution. It is at the same time one of the most beautiful of wattles, and therefore I feel the responsibility of pointing it out as a fit subject for the bark-stripper.

Southern New South Wales and Northern Victoria.—It is a highland species in the Monaro, N.S.W., and there very rare.

19. *Acacia pravissima*, F. v. M., B.Fl., ii., 375.

This tall shrub has a thin, dark-grey to blackish bark, which yields a light-coloured powder, containing an unusually small proportion of fibre. But the expense of stripping it would bar its use practically, even if the percentage of tannic acid caused it to be a temptation to the stripper. A sample from Jindabyne, Snowy River, collected January, 1890, and analysed the following April, gave extract 31·75 per cent., and tannic acid 10·66 per cent. It was grown on granite soil, and was from shrubs 8 to 12 feet in height, and having a diameter of 1 to 3 inches.

Southern New South Wales and Victoria.—A highland species, found on the banks of the Snowy River.

20. *Acacia subporosa*, F. v. M. (*supporosa* in Muell., Fragm. iv, 5) B.Fl., ii., 382. "River Wattle."

A sample of bark from a Victorian locality yielded Baron Mueller 6·6 per cent. of tannic acid and 1·2 per cent. of gallic acid. (*Cat. Technological Museum, Melbourne*).

A sample from Colombo, Candelo, N.S.W., was collected in June, 1889, and analysed by me April, 1890. It is a smooth, thin, fibrous, light-coloured bark, strongly resembling that of *A. longifolia*. It is from trees 20 to 30 feet in height, and with diameters of 6 to 15 inches. It was grown in granite country. My analysis gave 22·55 per cent. of extract, and 6·6 per cent. of tannic acid, peculiarly coincident with the determination already given. I may mention that I have made determinations of gallic acid and impurities in all my analyses, and I shall be happy to give particulars in the case of individual barks to anyone who applies for them. They are not of sufficient practical importance to Australian tanners to print here. In this particular instance my determination of gallic acid was 1·16 per cent.

Found in coast districts in New South Wales and Victoria, on the banks of creeks and rivers. Its most northern extension for New South Wales appears to be the Shoalhaven River.

21. *Acacia homalophylla*, A. Cunn., B. Fl., ii., 383. "Curly or Narrow-leaved Yarran." A "Myall." Called also "Gidgee."

A specimen of this bark gave the following result:—Extract, 21·51 per cent., and tannic acid 9·06 per cent. (*Proc. R.S., N.S.W.*, 1887, p. 189).

It was from an old tree, full of flakes, and could be pulled to pieces with the fingers. A dry-country bark, but hardly a fair specimen of that. Found in the interior of South Australia, Victoria, New South Wales, and Queensland.

22. *Acacia pendula*, A. Cunn., B. Fl., ii., 383. "Bastard Gidgee" or "Nilyah." Usually known as "Myall."

A sample of this bark from Yandarlo, Wilcannia, afforded the author (*Proc. R.S., N.S.W.*, 1888, p. 269) 14·52 per cent. of extract, and 3·25 per cent. of tannic acid. Height of tree, 10 to 12 feet; diameter, 4 to 6 inches;

collected September, 1887; analysed August, 1888. A typical representative of the dry-country wattle-barks. It seems to consist of nothing but flakes and layers of fibre.

An inland and desert species of New South Wales and Queensland.

22*a*. *Acacia pendula, var. glabrata.* A "YARRAN."

Bark from this variety, obtained from near Hay, N.S.W., yielded the author 17·91 per cent. of extract, and 7·15 per cent. of tannic acid. (*Proc. R.S., N.S.W.*, 1887, p. 89).

A moderately deeply fissured bark from rather an old tree, containing abundance of poor fibre. A dry-country wattle, and apparently of no promise.

23. *Acacia Oswaldi*, F. v. M., B. Fl., ii., 384. "MILJEE." "KARAGATA." Often called "Umbrella bush," as it is a capital shade tree.

The bark from an oldish tree has been examined by the author, with the following result:—Extract, 20·7 per cent.; tannic acid, 9·72 per cent. This much resembled the sample of *A. homalophylla* bark. (*Proc. R.S., N.S.W.*, 1887, p. 189).

In all the colonies except Tasmania; an inland desert species.

24. *Acacia stenophylla*, A. Cunn., B.Fl., ii., 385.

A sample of bark from this wattle, obtained from Yantara, Milparinka, N.S.W., gave the author (*Proc. R. S., N.S.W.*, 1888, p. 270), 24·46 per cent. of extract, and 9·49 per cent. of tannic acid. Height of tree 15 to 20 feet, diameter 6 to 12 inches.; collected, November, 1887; analysed, September, 1888. A rugged-looking, coarsely fissured bark, possessing the characteristic appearance of those of the dry country wattles. Average thickness, $\frac{5}{8}$ in.

A dry-country species, found in all the colonies except Tasmania.

25. *Acacia melanoxylon*, R.Br., B.Fl., ii., 388. The "BLACKWOOD," but also variously known as "Lightwood," "Black Sally," "Hickory," "Silver Wattle."

The bark of this highly valuable timber has usually gone to waste, after the wood has been obtained from the logs. The bark is, however, rich in tannic acid, and ought not to be left unutilised, though no trees of this species should be sacrificed for the sake of their bark alone. (Mueller.) A sample of bark from Monga, near Braidwood, N.S.W., yielded the author 20·63 per cent. of extract, and 11·12 per cent. of tannic acid. (*Proc. R.S., N.S.W.*, 1887, p. 31) It was apparently from an old tree, of a dirty brown colour, with whitish patches, giving the whole a silvery appearance; has irregular vertical fissures, and this circumstance, with the small horizontal cracks, causes the outer bark to be readily detached in small flakes. The inner bark or bast is very strong, and would form an excellent coarse tying material for local use.

All the colonies, except Western Australia and Queensland; chiefly a highland and mountain species, but also on the coast. As far as I know, it does not extend further north in New South Wales than the Illawarra Range, but it is not found of any size further north than Bonang (near Victorian border); at all events, in accessible localities.

26. *Acacia implexa*, Benth., B.Fl., ii., 389.

I have analysed a sample of this bark (*Proc., R.S., N.S.W.*, 1888, p. 270). It gave 20·54 per cent. of extract, and 7·82 per cent. of tannic acid. It is slightly bitter to the taste, but this sample is from an old cultivated tree, and the bitterness is less noticeable; hoary-looking, in layers and flakes; average thickness, ¼ in.

Victoria, New South Wales, and Queensland; chiefly a coast species, and on eastern mountain slopes.

27. *Acacia harpophylla*, F.v.M., B.Fl., ii., 389. The common "BRIGALOW;" so called because it forms the scrubs of that name; the meaning of the word is unknown.

This tree is said to yield a considerable amount of tan-bark.
Central Queensland.

28. *Acacia binervata*, DC., B.Fl., ii., 390. "BLACK WATTLE" or "HICKORY." "Myimbarr" of the aboriginals of Illawarra (New South Wales).

The bark is used by tanners, though it is not so rich as that of *A. decurrens*. (W. Dovegrove.) Nevertheless, it is a valuable bark; specimens from Cambewarra, N.S.W., yielded the author up to 58·03 per cent. of extract, and 30·4 per cent. of tannic acid. The colour of this sample was dark brown; the inner bark warm red-brown; the outer bark deeply fissured or flaky, which makes it more or less pulverulent; the inner bark contains abundance of strong fibre; diameter, 12 inches; height, 20 to 25 feet; locally called "Black Wattle." (*Proc. R.S., N.S.W.*, 1887, p. 90.)

A second sample from the same locality gave 28·2 per cent. of tannic acid, and yielded 51·5 per cent. of extract.

Additional samples of barks of this species are desired.

I have examined a specimen from Tomerong, near Jervis Bay, N.S.W. (between Nowra and Milton), which was collected February, 1888, and analysed the following September (*Proc. R.S., N.S.W.*, 1888, p. 273). As received, it had had its first crushing in the mill, nevertheless it was possible to pick samples showing a fair proportion of inner and outer bark. The outer bark is somewhat scaly, and the inner bark is light reddish-brown and very fibrous. It cannot be mistaken for *A. decurrens* bark owing to its fibrous nature. It gave extract 37·8 per cent.; tannic acid, 19·3 per cent.

This sample was taken from bulk actually used by a tanner, and it will be found, in general, that barks containing 20 per cent. of tannic acid are commonly used by country tanners; in fact, if bark of a species gives as high as 15 per cent. of tannic acid, it is worthy of enquiry whether richer specimens are available.

This is a coast-species of New South Wales and Queensland. It does not extend further south in our Colony than the Ulladulla District.

29. *Acacia flavescens*, A. Cunn., B.Fl., ii., 391.

This bark contains 10·2 per cent. of tannin. (Staiger.) Queensland.

30. *Acacia longifolia*, Willd., B.Fl., ii., 397. "GOLDEN WATTLE," "WHITE SALLOW," "SALLY," "HICKORY," &c.

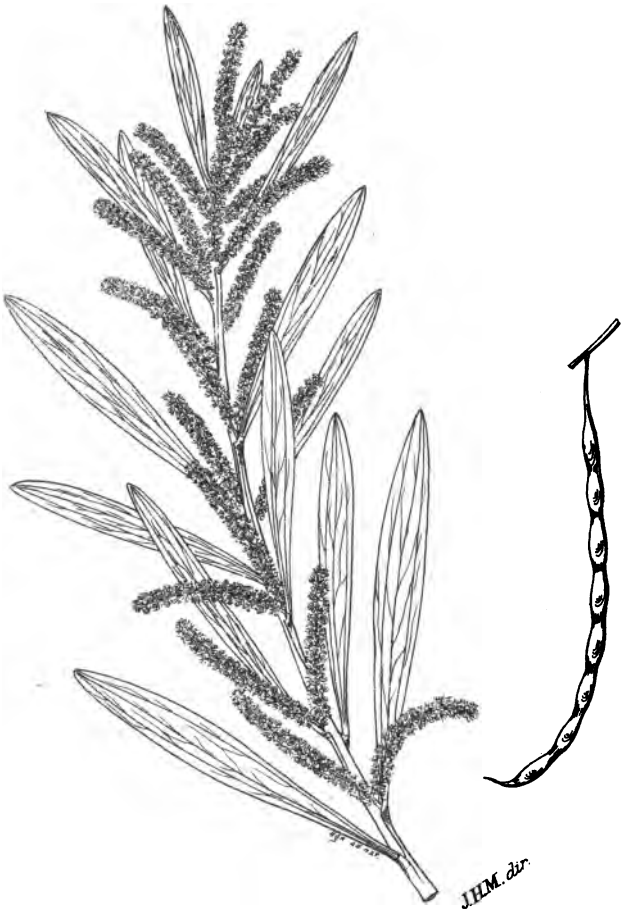
The bark of this tree is considered in Queensland to be only half as good as that of *A. decurrens*. It is used chiefly for sheepskins. The following is an analysis of this bark:—Tannin, 12·67 per cent.; extract, 32·05 per cent.

*Acacia binervata*

*A Black Wattle or Hickory*

(5a*88-80(d))

PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE
SYDNEY, NEW SOUTH WALES.




*Acacia longifolia*

*Sydney Golden Wattle*

(52"33-30(e1)

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(Staiger.) A specimen from Cambewarra, N.S.W, yielded the author 30·55 per cent. of extract, and 18·93 per cent. of tannic acid. (*Proc. R.S., N.S.W.*, 1877, p. 90.) Other specimens (*a*) from Oatley's grant, near Sydney, and (*b*) Ryde, near Sydney, yielded the author (*loc. cit.*, p. 190), 24·91 and 23·53 per cent. of extract respectively, and 15·34 and 15·99 per cent. of tannic acid respectively. Both were from much younger trees than the specimens from Cambewarra.

Speaking generally, this is a smoothish, thin, sub-scaly bark, not in high repute. It yields a light-coloured powder.

A sample from Tantawanglo Mountain, near Candelo, N.S.W., and locally known as "Hickory," was examined by the author, and found to contain 5 per cent. of tannic acid, and only 14 per cent. of extract. It was collected in July, 1889, and analysed in April, 1890. It was from trees 20 to 50 feet high, with diameters of 4 to 12 inches, growing on chocolate soil. The trees of this species attain rather large dimensions in this district. The bark becomes coarser and larger, but it is one mass of fibre, and practically useless to the tanner.

South Australia, Tasmania, Victoria, New South Wales, Southern Queensland.

30*a*. The bark of the variety *Sophoræ* is used for tanning light skins in Queensland, but as it is comparatively weak in tannin it fetches but a low price. It is there called "Black Wattle." (Bailey.) Mr. W. Adam informs me that Sydney fishermen often tan their sails and nets with this bark, and are well pleased with it, the articles being pliable after use.

30*b*. A second variety of *A. longifolia*, viz., *floribunda*, obtained from Cambewarra in August, 1886, yielded the following result in April, 1890:—Tannic acid, 6·09 per cent.; extract, 14·95 per cent. It was from trees 20 to 50 feet high, locally known as "Sally," or "Sallow." The bark is very like that of the normal species, but from an older tree, and also full of fibre. A specimen of "Sally" from Bolong Swamp, Nowra, collected in July, 1888, and analysed also in April, 1890, gave only 2·54 per cent. of tannic acid, with 13·07 per cent. of extract. It is a useless, fibrous bark, yielding a substance like chopped grass when passed through the mill. It was from trees 20 to 40 feet high, with diameter of 6 to 18 inches, and grown on alluvial soil, which the species in general usually favours.

31. *Acacia aneura*, F. v. M., B.Fl., ii, 402. "MULGA." The chief ingredient of Mulga scrub, so called from the Mulga, or long, narrow shield of wood made by the aboriginals out of Acacia wood.

A specimen of the bark of this tree from Ivanhoe, N.S.W., yielded the author 10 per cent. of extract, and 4·78 per cent. of tannic acid. A narrow-leaved variety from the same neighbourhood yielded 20·72 per cent. of extract, and 8·62 per cent. of tannic acid. The former is a deeply-furrowed, flaky, pulverulent bark, apparently from an old tree; average thickness, $\frac{3}{8}$ inch. The bark of the narrow-leaved variety is a thin, poor bark, not exceeding $\frac{3}{16}$ inch in thickness, moderately fissured, of a dark grey colour, sometimes nearly black. (*Proc. R.S., N.S.W.*, 1887, p. 32.)

A second sample of the normal species gave the author (*Proc. R.S., N.S.W.*, 1888, p. 271) 12·12 per cent. of extract, and 2·32 per cent. of tannic acid. It was from Tarella, Wilcannia; collected August, 1887; analysed August, 1888. A useless, flaky, dry-country bark.

An inland, desert species, found in all the colonies except Tasmania.

32. *Acacia glaucescens*, Willd., B.Fl., ii., 91. A "MYALL" and "BOREE" of Southern N.S.W. Called also "BRIGALOW," "ROSEWOOD," &c. Called "BLACK WATTLE," at Mount Victoria.

Bark from near Bombala, N.S.W., yielded the author 14·29 per cent. of extract, and 8·10 per cent. of tannic acid. (*Proc., R.S., N.S.W.*, 1887, p. 91.) It was locally termed "Myall," and was grown on limestone. Height, 20 to 25 feet; diameter, 6 to 12 inches. A deeply fissured bark of a dark grey colour. I would like to get better samples of this bark.

From Victoria to Queensland; a favourite situation being high river banks amongst rocks.

33. *Acacia Cunninghamii*, Hook., B.Fl., ii., 407. "BLACK WATTLE." "BASTARD MYALL" of Northern New South Wales. "Kowarkul" of the Queensland aboriginals.

The following is an analysis of this bark:—Tannin, 9·13 per cent.; extract, 16·15 per cent. (*Queensland Comm., Col. and Indian Exh.*, 1886.)

About Drake, N.S.W., this is a middle-sized tree, having a maximum trunk-diameter of 1 foot. It grows in abundance on the ridges in granite and dioritic soil.

Central New South Wales to Central Queensland.

34. *Acacia leptocarpa*, A. Cunn.; B.Fl., ii., 407.

The following is an analysis of this bark:—Tannin, 10·20 per cent.; extract, 26·41 per cent. (Staiger.)

Queensland.

35. *Acacia polystachya*, A. Cunn., B.Fl., ii., 407.

This bark contains 7·59 per cent. of tannin. (Staiger.)

Queensland and Northern Australia.

36. *Acacia aulacocarpa*, A. Cunn., B.Fl., ii., 410. "HICKORY WATTLE." (Bailey.) "Dilka" of the Port Curtis blacks. (Hedley.)

This tree yields a tan-bark, used in Queensland to some extent.

Central and Northern Queensland.

37. *Acacia elata*, A. Cunn., B.Fl., ii., 413. A "MOUNTAIN HICKORY."

A specimen of bark of this tree was analysed by the author (*Proc., R.S., N.S.W.*, 1888, p. 271), and yielded 36·2 per cent. of extract, and 20·11 per cent. of tannic acid. Height, 50 ft.; diameter, 8 inches. Flaky and somewhat rugged on the outside, but usually blackish and stained with lichens on account of its habitat (gullies). This bark reminds one of that of *A.*

*Acacia decurrens*

*Sydney Black Wattle*

(5a*83-80(1))

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*decurrens* when young. This is a tree of very local distribution (Blue Mountains, N.S.W.), and were it more abundant it would come into notice as a tanner's bark, since the sample examined was hardly up to the average quality obtainable.

Two samples of this bark were received at the Technological Museum, May, 1890, from Kanimbla Valley, Blue Mountains; one from a large tree 30 to 50 ft. high, diameter, 15 in.; the other from a small tree.

The bark of the larger tree contained much scaly material on the outside of a dark brown colour, which, being deficient in taunic acid, detracts from the value of this bark.

The thickness of this bark is 1 inch, half of which represents the inner bark, which is fibrous, very astringent, and of a light colour. Analysis of this bark (a fair section of the outer and inner barks being taken) was made in June, 1890, and found to contain 51·15 per cent. of extract and 28·5 per cent. of tannic acid. The liquor is of too dark a colour to be first-class, but would be improved by removing the outer scaly bark before grinding if that were possible.

The bark from the younger tree was solid, slightly scaly on the outside, and ¼ inch in thickness. When powdered, it was hardly to be distinguished from some specimens of *decurrens* bark, being light coloured, and altogether a promising bark. Analysis shows this to contain 55·35 per cent. of extract, and 31·1 per cent. of tannic acid.

38. *Acacia pruinosa*, A. Cunn., B.Fl., ii., 413.

A sample obtained, May, 1890, from Kincumber, near Gosford, New South Wales, from a largish tree, was barely ⅛ inch thick when green, and this, of course, would diminish on drying; this specimen was analyzed June, 1890, and was found to contain 49·75 per cent. of extract, and 24·25 per cent. of tannic acid, so that it is not a worthless species as is often supposed. It would come in Class B. This yields a thin greyish bark, containing little fibre; it powders well, and might easily be mistaken for a bark of superior quality. The yield would not be large even from good sized trees, as the bark is too thin.

This wattle is abundant in the neighbourhood of Gosford, N.S.W., where it attains a large size. It is, however, rather weak in tannic acid, and a mill may be seen falling into decay, because *after* the plant was erected the owner found that the bark would not pay to convey far. From superficial knowledge he might have jumped to the conclusion that the tree was *A. decurrens*, but the fact remains that a man was foolish enough to expend a fair amount of capital without taking the trouble to make sure he had suitable bark.

New South Wales and Queensland. Its southern limit appears to be the Brogo River, near Bega.

39. *Acacia decurrens*, Willd., B.Fl., ii., 214. "BLACK WATTLE"; called also "GREEN and FEATHERY WATTLE." Called "SYDNEY WATTLE" by Baron Mueller. Formerly the "Wat-tah" of the aboriginals of the counties of Cumberland and Camden, N.S.W. (Macarthur.)

The following analysis of this bark was given by the Queensland Commissioners at the Colonial and Indian Exhibition of 1886: Tannin, 15·08 per cent.; extract, 26·78 per cent. This bark becomes undoubtedly inferior in the warmer climate of Queensland.

This species flowers in the early spring, whereas *A. mollissima* (which it closely resembles), flowers in midsummer. A black bark, slightly rugged, from Mulgoa, Penrith, gave me 35·56 per cent. of tannic acid, and 59·2 per cent. of extract. It was known locally as "Green Wattle."

A specimen from Ryde, near Sydney, yielded the author 48·74 per cent. of extract, and 32·33 per cent. of tannic acid. (*Proc. R.S., N.S.W.*, 1887, p. 93.)

A sample from Cambewarra, N.S.W., from trees 20 to 30 feet in height, and 6 to 8 inches in diameter, gathered in August, 1886, was found to contain 52·16 per cent. of extract, and 32·08 per cent. of tannic acid. (*Proc. R.S., N.S.W.*, 1887, p. 33.) A bark grown in the same neighbourhood, and analysed in April, 1890, gave 47·1 per cent. of extract, but only 24·13 per cent. of tannic acid. It is a smooth bark, but from a young tree, being only $\frac{1}{8}$ of an inch thick, and rather fibrous. Had this bark been allowed to remain on the tree a couple of years longer, I feel sure that the percentage of tannic acid would have much increased.

A sample from Nerriga (on the high table-land from Nowra to Braidwood, N.S.W.) was analysed by the author, and gave the excellent result of 36·3 per cent. of tannic acid, with 62·54 per cent. of extract. (*Proc. R.S., N.S.W.*, 1888, p. 271.) Height of tree, 15 to 20 feet; diameter, 8 to 12 inches. It was stripped in January, and analysed the following August. This is the best sample of *A. decurrens* bark which has hitherto been examined by me.

A second sample from the same district yielded 31·75 per cent. of tannic acid, and 62·35 per cent. of extract; while a third sample gave 29·25 per cent. of tannic acid, and 59 per cent. of extract. A fourth gave 24·99 per cent. of tannic acid, and 53·96 per cent. of extract.

Mr. Thomas Shepherd, an enterprising tanner of Cambewarra, N.S.W., has kindly furnished me with the following information in sending the first sample from Nerriga. Of all New South Wales localities he prefers Nerriga for *A. decurrens* bark. He says it would be quite equal to Tasmanian if it could be obtained as finely ground. From Cambewarra bark Mr. Shepherd obtains only two liquors, of which the second is very weak, while from the Nerriga bark he invariably obtains three strong liquors. In his opinion the best time for stripping is when the trees are in bud, and have just come into flower. Next to the Nerriga bark he speaks highest of that coming from the Bega District.

Mr. Shepherd remarks that if the hides be tanned too hard, part of the tannin could be removed and the hides rendered softer. *A. binervata* bark permits this but not *A. decurrens*.

*A. decurrens* is an important tan-bark in most of the colonies, and as the tree grows in the poorest soils, every encouragement should be given to its cultivation. This wattle and the South Australian *A. pycnantha* will supplement each other, this wattle flourishing in situations too damp and cold for the latter. *A. decurrens* and *A. mollissima* are at present abundant on some Crown and other lands in various districts of the Colony, where thousands, and perhaps millions, of seedlings may be sometimes seen, forming a dense useless brush, liable to destruction by bush fires. In these localities we do not require to sow seed, but to use the tomahawk. Thin out freely, to admit light and air to the most promising seedlings, and they will have some chance of forming trees capable of carrying a merchantable amount of bark.

Mr. J. E. Brown states that in South Australia this species is much less hardy than *A. pycnantha.* Baron Mueller recommends planting of *A. decurrens* in worn-out lands over-run with sorrel. It is fond of moisture, and not of too much heat. The Baron also gives its rate of growth as about 1 in. in diameter every year. Mr. J. E. Brown mentions some trees in South Australia 30 feet high and 8 inches in diameter, only 5 years of age, and I can record similar experience near Sydney, and in New South Wales at least, it is a very hardy species. It is rather liable to attacks by borers; it would be interesting to enquire whether to a greater extent than *A. mollissima.*

This Acacia is being grown successfully on a somewhat extensive scale at Coonoor, in India. It thrives pretty well at Ootacamund, but does not bear fruit there.

North-eastern Victoria, New South Wales, and Southern Queensland; a coast, highland, and mountain species, not extending far inland.

40. *Acacia mollissima,* Willd., syn. *A. decurrens,* var.: *mollis.* B.Fl., ii., 415. "Black Wattle" of the older New South Wales colonists, and commonly so called in Victoria and Tasmania, but now usually called "Green Wattle" in New South Wales, and sometimes "Silver Wattle." "Garrong" of some aboriginals of Victoria, and "Warraworup" by those at the aboriginal station, Coranderrk.

"The bark, rich in tannin, renders this tree highly important. It varies, so far as my experiments have shown, in its tannin, from 30 to 54 per cent. (*sic*) in bark artificially dried. In commercial bark the percentage is somewhat less, according to the state of its dryness—it retains about 10 per cent. of moisture. 1½lb. of black-wattle bark gives 1 lb. of leather, whereas 5 lb. of English oak bark are requisite for the same results; but the tanning principle of both is not absolutely identical. Melbourne tanners consider a ton of black wattle-bark sufficient to tan twenty-five to thirty hides; it is best adapted for sole leather, and other so-called heavy goods. The leather is fully as durable as that tanned with oak bark, and nearly as good in colour. Bark carefully stored for a season improves in tanning power 10 to 15 per cent.* From experiments made it appears that no appreciable difference exists in the percentage of tannin in wattle-barks, whether obtained in the dry or in the wet season. Full-grown trees, which supply also the best quality, yield as much as 1 cwt. of bark. Mr. Dickinson states that he has seen 10 cwt. of bark obtained from a single tree of gigantic dimensions at Southport, Queensland. A quarter of a ton of bark was obtained from one tree at Tambo, Queensland, without stripping all the limbs. The height of this tree was 60 feet, and the stem 2 feet in diameter. The rate of growth is about 1 inch in diameter of stem annually. It is content with the poorest and driest, or sandy soils, although in more fertile ground its growth is more rapid. (Mueller, *Select Extra-tropical Plants.*)

Near Sydney this species flowers about Christmas, while *A. decurrens* flowers in the early spring (August). A sample of a smooth green bark from a young tree afforded me 33·5 per cent. of tannic acid, and 61·85 per

* We require careful experiments on the subject, making proper allowances for diminution of moisture on storage.

cent. of extract, while a second sample, from an older tree, gave 35·3 per cent. of tannic acid, and 59·05 per cent. of extract. Both were grown near Penrith, New South Wales.

I have examined a sample of bark of this species, called "Green Wattle," from Bell's Creek, Araluen, New South Wales. It was from trees 25 to 30 feet high, with diameters from 6 to 18 inches, was grown on granite soil, and was collected in November, 1888. In April, 1890, it was analysed with the following result:—Tannic acid 31·23 per cent., extract 64·15 per cent. It is a smooth compact bark, yields a light-coloured powder with some fibre, is a quarter of an inch thick, and is to be ranked with the best of our New South Wales barks.

A specimen bearing the same local name, and grown at Tombong, Snowy River, New South Wales, was collected in March, 1889. It was obtained from trees 20 to 33 feet high, and with diameters 6 to 15 inches, and was grown in granite country. It yielded (April, 1890) 24·63 per cent. of tannic acid, with 45·8 per cent. of extract. This sample is hardly fair to the species. It is rather thin, rugged, covered with lichens, and rather more fibrous than the generality of *A. mollissima* barks. In spite of the badly selected sample, the analysis shows that it is full of promise.

A specimen of wattle-bark was received in this Museum in the year 1883 from a South Australian firm, labelled *A. dealbata*, Mount Crawford District, South Australia, containing 29·25 per cent. of tannic acid, according to an analysis by Mr. Thomas, of Adelaide. Now *A. dealbata* is not found in that Colony, and I scarcely hesitate to place the bark under *A. mollissima*. I analysed this bark in April, 1890, and found it to contain 30·73 per cent. of tannic acid, with 55·5 per cent. of extract. Doubtless a portion of this percentage is owing to careful storage during seven years. It is a solid bark, a little scaly on the outside, and very much like *A. mollissima*, or *A. decurrens* bark in appearance. Thickness, $\frac{5}{16}$-inch. It yields a good powder, with but little fibre.

A sample of this bark, received May, 1890, and analysed the following month, was found to contain 34·85 per cent. of tannic acid and 61·5 of extract. It came from Burragorang, New South Wales. It is thicker than most barks of this species, and is beginning to be scaly on the outside. Were it not for that defect it would be a splendid bark. It was allowed to remain a year too long on the tree, a fault not usually to be found with New South Wales bark getters.

Found in all the colonies except Western Australia; a coast, highland, and mountain species, not extending far inland.

40A. *Acacia mollissima,—var. Leichhardtii*, F. v. M.

The bark of this variety is used by the local tanners, and is spoken of fairly well as regards percentage of tannin, but is not much liked on account of its being considered too hard and fibrous, and therefore difficult to break up in the mill.

It is a common belief amongst tanners (and at present I am not prepared to say what basis of truth it has) that barks much subjected to frost and snow are much richer in tannin than those not so subjected. The present sample is from a tree grown in a very cold district. It was collected

October, 1888, at Monga, from trees 20 to 25 feet high, and 6 to 18 inches in diameter, growing on granite soil. Thickness of bark, about $\frac{3}{16}$-inch. A smoothish bark of a light colour, but forming a rather fibrous powder. It was analysed April, 1890, and found to contain 26·4 per cent. of tannic acid, and 45·25 per cent. of extract.

This variety appears to be confined to New South Wales. It is found in the Monaro and Braidwood Districts, also in the Jingera Mountains.

41. *Acacia dealbata*, Link., B.Fl., iii., 415. "SILVER WATTLE."

Some specimens from Quiedong, Bombala, N.S.W., yielded the author 39·86 per cent. of extract and 21·22 per cent. of tannic acid. They were from trees 12 to 18 inches in diameter, and 20 to 30 feet high, and were grown on limestone country (*Proc., R. S., N.S.W.*, 1887, p. 92). A second sample from the same district gave 39·3 per cent. of extract and 17·1 per cent. of tannic acid. These samples bear a general appearance to *A. decurrens* bark, but they are much more rugged, and apparently from an old tree. The barks form a rather fibrous powder. The whitish external layer common in this species is almost absent.

I have examined a sample from the Delegate River, N.S.W., where the trees are growing in the brush (rich jungle), in chocolate soil, attaining a height of 60 to 100 feet, with a diameter of 1 to 2 feet. Bark collected in April, 1889, yielded the following April:—25·9 per cent. of tannic acid and 45·7 per cent. of extract. This has the general appearance of *A. decurrens* bark, but is in layers, separable with a little difficulty, more fibrous, and has the appearance of having been dusted on the outside with a white powder. This whitish appearance does not rub off, and the stem looks as if it had had a coat of lime wash.

There is great prejudice against this wattle in most of the colonies, yet analyses show that it is not to be despised. A perfectly smooth, thin, silvery or ash-grey bark, from near Penrith, N.S.W., gave me 24·13 per cent. of tannic acid, and 47·85 per cent. of extract.

"Silver Wattle" bark may be assumed to contain about 25 per cent. of tannic acid in the best samples.

In Tasmania it has often been recommended the destruction of these trees in order to let *A. mollissima* grow, and this advice is probably sound, but only in cases in which one or other has to be sacrificed.

"The bark of this tree is thinner and inferior to the Black Wattle (*A. mollissima*) in quality. It is chiefly employed for lighter leather. This tree is distinguished from the Black Wattle by the silvery, or, rather, ashy hue of its young foliage. It flowers early in spring, ripening its seed in about five months, while the Black Wattle blossoms late in spring, or at the beginning of summer, and its seeds do not mature before about fourteen months." (Mueller.)

I think I have adduced sufficient evidence to convince intelligent people that the bark is by no means a worthless one, and barks inferior even to this are locally used in districts not favoured with the alternative of the use of such barks as *mollissima* and *decurrens*. I hope that barks will be tried on their merits, and not be condemned without trial.

In insisting on the general principle of assay of barks, just as a man engaged in the mining industry is always careful to sample his stone as occasions require, I am quite aware of the special circumstances of Tasmania as regards the "Silver Wattle," and that the case in that Colony against this particular species is stronger than it is in our own. In Tasmania the silver wattle grows more in spars than with us; its bark has a more than ordinary tendency to shrink; it is tough and fibrous (though not to such an extent as *A. binervata*, for instance). As wattles take longer to mature in Tasmania than with us, it will be quite understood that I am in no way reflecting on the wisdom of the advice of letting the cultivation of the best species remain unimpeded.

This species is found in Victoria, New South Wales, and Queensland. It is chiefly a mountain species, and does not extend far inland.

# The Similarities and Dissimilarities of Acacia decurrens, mollissima, and dealbata.

*A. decurrens*, *A. mollissima*, and *A. dealbata* are very closely allied botanically, and have, in fact, been considered by various botanists as varieties of the same species; for the most ardent advocate of splitting up species cannot produce any very marked differences between them.

I have summarized below the differences between the three which are held to be specific, from a botanist's point of view; and from the point of view of the technologist all that I can say is that the very bad name of *A. dealbata* with some people is not borne out by my experiments, all the samples used in which are true to name, the utmost precaution being adopted to ensure accuracy. From my experiments it would appear that the percentage of tannic acid in *A. dealbata* is nearly two-thirds of that contained in *A. decurrens* and *A. mollissima*, which two species have very close affinities. They are at once distinguished in the field from *A. dealbata* by the ashy or silvery hue of the latter; but the differences between the three are not very marked in dried specimens, and that is the reason, I presume, why they have not hitherto been comparatively figured. I have spent much time endeavouring to note differences which might be brought out in a figure, but know of none other than the degree of constriction between the seeds. Careful examination of the subjoined comparative table will show that there are no sharp lines of demarcation between the three species, and that those botanists who look upon *A. mollissima* and *A. dealbata* as varieties of *A. decurrens* take up a position which is apparently as strong as those who divide them into separate species. Reference to the tables will show that *A. decurrens* and *A. mollissima* are very closely allied as regards yield of tannic acid, and, from the point of view of the tanner, I do not think there is a pin to choose between them. The average percentage of tannic acid in *A. dealbata* is, however, consistently lower than in the other two species or

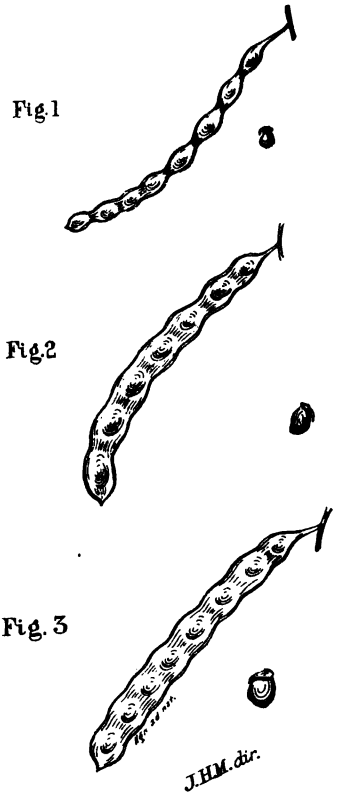


Fig 1 *Pod and Seed of Acacia decurrens* *Sydney Black Wattle*

" 2 " " " " " *mollissima* *Tasm. & Vict.* " "

" 3 " " " " " *dealbata* *Silver Wattle*

(52°83-80(g))

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varieties; but not so much lower as to cause its rejection as a wattle-bark without discrimination. I have already alluded to the subject under *A. dealbata*, but consider the matter of sufficient importance to repeat that *A. dealbata* is only rejected when the better barks *A. mollissima* or *A. decurrens* are readily available; for reference to the detailed accounts of several other barks shows that barks even inferior in quality to that of *A. dealbata* are in daily use by country tanners.

| (1)<br>*A. DECURRENS.*<br>Vic., N.S.W., Q. | (2)<br>*A. MOLLISSIMA.*<br>S.A., T., Vic., N.S.W., Q. | (3)<br>*A. DEALBATA.*<br>Vic., N.S.W., Q. |
|---|---|---|
| FOLIAGE, &c.:— | | |
| ..... | "At first yellowish."—F. v. M. | "At first whitish."—F. v. M.<br>"Leaves and branches bluish."—Spicer. |
| Pinnules conspicuously longer | ..... ..... | ..... |
| Branchlets from decurrence of leaf-stalks more angular than (2) or (3). | ..... | ..... |
| Branches almost glabrous ... | "Branches with *yellow* down."—Spicer. | The tips of the twigs are sometimes also yellowish.—J.H.M. |
| ORDER AND TIME OF FLOWERING:— | | |
| Second.<br>..... | Third.<br>"Late in Spring or beginning of Summer."—F. v. M. | First.<br>"Early in Spring."—F. v. M. |
| FLOWERS:— | | |
| Although I know the flowers of *A. decurrens* very well, I should be sorry to dogmatise as to the tint of yellow.—J.H.M. | "Usually pale yellow."—F. v. M. | "Usually bright yellow."—F. v. M. |
| PODS:— | | |
| Rather narrow; much constricted between the seeds; strongly compressed. | Rather narrow; constricted between the seeds. | Rather broadish; hardly constricted between the seeds. |
| SEEDS:— | | |
| ..... | Shorter than (3); arillar appendage shorter.<br>"Ripens seeds in 14 months."—F. v. M. | Arillar appendage pale; much attenuated.<br>"Ripens seeds in 5 months."—F. v. M. |
| BARK:— | | |
| "Not quite so powerful as (2)."—Mueller. (As regards tannic acid). | Not a pin to choose between (1) and (2) as regards the bark.—J.H.M. | "Much thinner bark, and greatly inferior to (1) and (2)."—Mueller. |

# Tabular Statements of Wattle-Bark Analyses.

## (a.) THE MOST VALUABLE WATTLE-BARKS.

*(Each Table arranged in Alphabetical Order of Species names).*

| Local Name. | Species Name. | Percentage of Tannic Acid. | Authority. | Where Grown. |
|---|---|---|---|---|
| A black wattle | *binervata* | 30·4 | Maiden | N.S.W. |
| | ,, | 28·2 | ,, | ,, |
| | ,, | 19·3 | ,, | ,, |
| *Willow or broom wattle | *calamifolia (?)* | 36·06 | ,, | S.A. |
| Black or Sydney wattle | *decurrens* | 15·08 | Exhibition Commissioners. | Q. |
| | ,, | 36·3 | Maiden | N.S.W. |
| | ,, | 35·56 | ,, | ,, |
| | ,, | 32·33 | ,, | ,, |
| | ,, | 32·08 | ,, | ,, |
| | ,, | 24·13 | ,, | ,, |
| A mountain hickory | *elata* | 20·11 | ,, | ,, |
| | ,, | 28·5 | ,, | ,, |
| | ,, | 31·1 | ,, | ,, |
| Tasmanian and Victorian | *mollissima* | 30·73 | ,, | S.A. |
| Black wattle | ,, | 35·3 | ,, | N.S.W. |
| Green wattle | ,, | 33·5 | ,, | ,, |
| | ,, | 31·23 | ,, | ,, |
| | ,, | 24·99 | ,, | ,, |
| | ,, | 24·63 | ,, | ,, |
| | ,, | 34·85 | ,, | ,, |
| | ,, *var. Leichhardtii* | 26·4 | ,, | ,, |
| Hickory | *penninervis* | 14·49 | Exhibition Commissioners. | Q. |
| | ,, | 34·0 | Maiden | N.S.W. |
| | ,, | 16·96 | ,, | ,, |
| Broad-leaved wattle | *pycnantha* | 16·24 | ,, | ,, |
| | ,, | 46·47 | ,, | S.A. |
| | ,, | 39·1 | ,, | ,, |
| | ,, | 37·5 | ,, | ,, |
| | ,, | 33·75 | ,, | ,, |
| | ,, | 28·5 | ,, | ,, |
| | ,, | 36·25 | ,, | ,, |
| | ,, | 36·5 | ,, | ,, |
| | ,, | 37·5 | ,, | ,, |
| | ,, | 32·95 | ,, | ,, |
| | ,, | 37·25 | ,, | ,, |
| | ,, | 38·5 | ,, | ,, |
| | ,, | 35·95 | ,, | ,, |
| | ,, | 32·1 | ,, | ,, |
| | ,, | 35·5 | ,, | ,, |
| | ,, | 35·45 | ,, | ,, |
| | ,, | 25 to 34 | Goyder | ,, |
| Weeping wattle | *saligna* | 30·0(?) | Mueller | W.A. |
| | *vestita* | 33·2 | Maiden | N.S.W. |
| | ,, | 27·96 | ,, | ,, |

* Placed here provisionally. See page 17.

## (b.) WATTLE-BARKS OF SECONDARY VALUE.

| Local Name. | Species Name. | Percentage of Tannic Acid. | Authority. | Where grown. |
|---|---|---|---|---|
| ..... | *amœna* ..... | 23·5 | Maiden ..... | N.S.W. |
| Silver wattle... ..... | *dealbata* ..... | 25·9 | ,, ..... | ,, |
| | ,, ..... | 24·13 | ,, ..... | ,, |
| | ,, ..... | 21·22 | ,, ..... | ,, |
| | ,, ..... | 17·1 | ,, ..... | ,, |
| Golden wattle ..... ..... | *longifolia* ..... | 12·67 | Exhibition Commissioners | Q. |
| | ,, ..... | 18·93 | Maiden ..... | N.S.W. |
| | ,, ..... | 15·09 | ,, ..... | ,, |
| | ,, ..... | 15·39 | ,, ..... | ,, |
| | ,, ..... | 5·0 | ,, ..... | ,, |
| Sally ..... | ,, var. *floribunda** | 6·09 | ,, ..... | ,, |
| | ,, ... | 2·54 | ,, ..... | ,, |
| Blackwood..... | *melanoxylon* ..... | 11·12 | ,, ..... | ,, |
| A black wattle ..... | *neriifolia* ..... | 13·91 | Exhibition Commissioners | Q. |
| A silver wattle ..... | *podalyriæfolia* ..... | 12·4 | ,, | ,, |
| Grey wattle ..... | *prominens* ..... | 18·03 | Maiden ..... | N.S.W. |
| | ,, ..... | 14·42 | ,, ..... | ,, |
| ..... | *pruinosa* ..... | 24·25 | ,, ..... | ,, |
| Cooba ..... | *salicina* ..... | 13·51 | ,, ..... | ,, |
| | ,, ..... | 13·21 | ,, ..... | ,, |
| | ,, ..... | 15·1 | ,, ..... | ,, |

* Placed here provisionally, so as not to separate the variety from its species.

## (c.) WORTHLESS WATTLE-BARKS.

| Local Name. | Species Name | Percentage of Tannic Acid. | Authority. | Where Grown. |
|---|---|---|---|---|
| Mulga | *aneura* | 4·78 | Maiden | N.S.W. |
| | ,, | 2·32 | ,, | ,, |
| Narrow-leaved mulga | ,, *var.* | 8·62 | ,, | ,, |
| Wait-a-while | *colletioides* | 4·4 | ,, | ,, |
| A black wattle | *Cunninghamii* | 9·13 | Exhibition Commissioners. | Q. |
| | *flavescens* | 10·2 | ,, | ,, |
| Myall or boree | *glaucescens* | 8·10 | Maiden | N.S.W. |
| Curly yarran | *homalophylla* | 9·06 | ,, | ,, |
| | *implexa* | 7·82 | ,, | ,, |
| | *leptocarpa* | 10·2 | Exhibition Commissioners. | Q. |
| Miljee | *Oswaldi* | 9·72 | Maiden. | N.S.W. |
| Bastard gidgee or myall | *pendula* | 3·25 | ,, | ,, |
| Yarran | ,, *var. glabrata* | 7·15 | ,, | ,, |
| | *polystachya* | 7·59 | Exhibition Commissioners. | Q. |
| | *pravissima* | 10·66 | Maiden | N.S.W. |
| Nealie or needle-bush | *rigens* | 6·26 | ,, | ,, |
| | *sentis* | 10·26 | ,, | ,, |
| | ,, | 6·32 | ,, | ,, |
| | *siculiformis* | 7·87 | ,, | ,, |
| | *stenophylla* | 9·49 | ,, | ,, |
| River wattle | *subporosa* | 6·6 | ,, | ,, |
| Dead finish | *tetragonophylla* | 5·59 | ,, | ,, |
| | *verniciflua* | 3·16 | ,, | ,, |

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[Seven plates.]

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# DEPARTMENT OF PUBLIC INSTRUCTION—TECHNICAL EDUCATION BRANCH.

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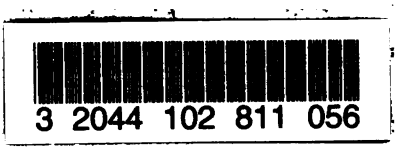
F. BRIDGES,

*Head Office, 301, Pitt-street.* Superintendent of Technical Education.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